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Cell Phone-Based Expert Systems for Smoking Cessation

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14. ABSTRACT
This project examined the effectiveness of tailored text messages as an enhancement to a computerized tailored intervention (CTI) for smoking cessation with Veterans. CTIs have shown increasing promise as useful behavior change programs for improved health behaviors; however, the ubiquity and sophistication of today's wireless mobile technologies represent new modes of delivery for evidence-based smoking cessation and other behavioral health interventions. The CTI is based on the Transtheoretical Model of Behavior Change (TTM) and developed by Pro-Change Behavior Systems, Inc. A randomized clinical pilot study tested the effectiveness of the CTI alone and CTI plus individualized text messaging enhancements in reducing smoking behavior in Veterans. In addition to smoking cessation, readiness to change other negative health behaviors — such as alcohol use, health eating, and exercise — was also assessed. Four-hundred and forty-six Veterans were recruited at baseline. All participants were active smokers, distributed across the stages of change as 11.9% in Precontemplation (n=53; not intending to change in the next 6 months); 63% in Contemplation (n=281; intending to change in the next 6 months), and 25.1% in Preparation (n=112; intending to change in the next 30 days). Two-hundred and thirty-five individuals (52.7%) completed the one-month and three-month follow-ups: n=116 in the treatment group (CTI only; Tx) and n=119 in the treatment-plus group (CTI plus text messages; Tx-plus). Results indicated that the CTI-plus-text-messaging intervention outperformed the CTI-only intervention at an unprecedented quit rate. For those participants in the Tx group 32.8% had quit smoking at three-month follow-up; however, those in the Tx-plus group had quit rates of 43.2%. These findings are highly encouraging, and exceed those quit rates found for other CTI interventions for both groups by almost 15% (Krebs, Prochaska & Rossi, 2010). This was the first study to adapt a smoking cessation Internet-based CTI to provide personalized feedback on a cell phone to reduce smoking behaviors in military Veterans. The findings suggest that behavior change interventions can be successfully delivered to Veterans via the Internet, and that tailored text messaging can significantly enhance the intervention effects,

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INTRODUCTION

Cigarette smoking remains the leading cause of preventable disease and death in the United States, contributing to the deaths of more than 443,000 people each year[1]. It is also responsible for 80% of lung cancers, and 30% of all cancers nationwide. The U.S. Preventive Services Task Force has labeled tobacco cessation as one of the highest priority services with the lowest delivery rate[2]. Smoking and associated nicotine dependence represents a chronic condition that can be very difficult to successfully treat. An estimated 53.1% of smokers report that they have stopped smoking for at least 24 hours in the previous year[3]; however, actual rates of long-term cessation are substantially lower[4].

One segment of the U.S. population with a disproportionately high smoking rate is the military. A survey of U.S. troops deployed to Iraq and Afghanistan, found that nearly 40% smoked at least one-half pack of cigarettes per day — with nearly half of smokers reporting that they started or resumed smoking during their deployment[5]. In addition, more than 12% of all military personnel (14.5% among males) report using smokeless tobacco[6]. Many Veterans begin smoking while enrolled in the military, so it is not surprising that the smoking rate among Veterans (34%) also exceeds that of the general population[7]. Previous studies report an historic smoking rate of 74% among Veterans, compared with 48% among non-Veterans[8]. Smoking contributes to high morbidity and mortality rates among Veterans[9], as well as nearly $1 billion annually of lost productivity in the military[10]. In his 1997 economic analysis, Harris concluded that if all Veterans who ever smoked filed disability claims—even if they started regular cigarette use prior to military service— the total potential costs due to all smoking-related diseases would equal $18.4 to $19.8 billion[11].

High rates of smoking among military personnel persist after discharge from military service[10]. Overall, smoking cessation interventions for military personnel have resulted in abstinence rates between 12% and 19%, which is lower than those for civilian populations[12,13]. Both the DoD and the Department of Veterans Affairs (VA) have made smoking cessation a priority for health promotion and disease prevention. In 1993, the Air Force set a smoke-free goal for 1998 and in 1992 the Navy set one for 2000. These goals have not yet been achieved[14]. To date, only Veterans ages 75 or older have met the Year 2000 goal for fewer than 15% tobacco users[15].

This project aimed to improve the health of Veterans through the reduction of smoking behaviors by utilizing a theory-based, computerized, tailored intervention (CTI) with text messaging feedback. It was theorized that the ubiquity and sophistication of today's wireless mobile technologies would represent new modes of delivery for empirically based smoking cessation and other behavioral health interventions. A two-group 3-month randomized controlled pilot study was conducted to determine the effectiveness of adding tailored text messages to a web-based CTI to decrease smoking in Veterans. The following hypotheses were examined:

Hypothesis 1: The structure and content of the cell phone-based CTI for smoking cessation will be appropriate and relevant to Veterans.

Hypothesis 2: Cell phone-based CTI will facilitate greater smoking cessation behavior change than assessment only on a web-based CTI.

A list of Study Personnel and a compilation of Milestones are attached as Appendices A and B. The study Timeline is attached as a Gantt Chart in Appendix C.

BODY

Task 1.0 IRB Protocols Submission and Approval (100% complete)

1.1 Local IRB review and approval

1.2 Second-tier level review and approval (USAMRMC, HRPO)

Task 2.0 Adaptation of CTI Smoking Modules Based on Feedback from Focus Groups (100% complete)

2.1 Analyze data and identify content modifications

2.2 Modify the CTI Smoking Module based on analysis of feedback from Focus Groups

Task 3.0 Modify Web-based Feedback Message to Text Messages (100% complete)

3.1 Modify language, tone, and content of feedback narratives for smoking module

Task 4.0 Conduct Beta and Usability Testing on Cell Phone (100% complete)

4.1 Conduct beta testing of system

4.2 Conduct usability interviews with Veterans

Task 5.0 Conduct Pilot Study (100% complete)

5.1 Recruit participants and conduct baseline assessment

5.2 Monitor participation at 1-month assessment point

5.3 Monitor 3-month assessment points

Task 6.0 Analyze data and interpret results (100% complete)

6.1 See Methods section below.

Task 7.0 Submit Final Report (100% complete)

7.1 Prepare and submit final report

7.2 Prepare manuscripts for publication

7.3 Prepare presentation materials for scientific meetings

METHODS

This randomized, prospective pilot employed a 2 (group) x 3 (timepoint) research design. Veteran smokers were recruited nationally from direct mailings, Facebook ads, community newsletters, posters, and flyers. In addition to the randomized control trial (RCT), a focus group (n=9) and individual usability tests (n=4) were conducted in order to assess the acceptability of the graphic user interface, questions, tailoring and program content to Veteran smokers.

While behavioral health interventions have traditionally been carried out without the use of technology, steady advances in behavioral science, communications and computer technology have contributed to the development of individualized CTIs that motivate behavioral change[16]. Computer- and Internet-based interventions have performed well in several efficacy studies[17]. In fact, randomized controlled trials have supported the efficacy of computer and Internet-based interventions as comprehensive interventions, i.e., with minimal or no clinician contact, for panic disorder[18], depression[19–23], weight loss[24], and diabetes self-management[25].

Computerized interventions have several potential advantages over non-computerized protocols[17]. First, computer-based interventions are often designed to interact directly with users and can be tailored to the needs of a diverse group of participants. This allows for personalization of recommendations with minimal burden of superfluous material. Second, precise user data (e.g., time burden on users, answers to knowledge questions) are more readily collected via interactive computerized interventions relative to other, non-computerized "self-help" methods, such as bibliotherapy or videotape protocols. Third, Internet-based interventions can reach a large population at relatively low cost and can be accessed wherever computers are available, whereas traditional self-help interventions may be less accessible for portions of the population. Fourth, they can be accessed privately from individuals' homes and completed at users' own pace. Finally, they can be easily adapted as empirical findings are updated. Moreover, adaptive interventions that offer multiple contacts in which messages are dynamically tailored are more effective than traditional one-size-fits all interventions. Further, computer and Internet-based behavioral health yield equally effective treatment outcomes compared to self-help interventions delivered via other methods[26].

Advanced CTIs, such as the one used in this study, have been previously developed for civilian adults with NIH funding by our research collaborators, Pro-Change Behavior Systems. These systems employ empirical databases consisting of data collected from thousands of

participants and heuristics provide the surface knowledge used to establish decision rules that guide the development of individualized interventions tailored on behavior change theory variable[16,27] . Additionally, the low-cost CTI has the potential to facilitate active engagement in the change process and significantly enhance the benefits of traditional treatment.

While CTIs have been utilized for some time, delivering such programs through the Internet is still in an early stage of development[28]. CTIs have evolved from distributing tailored feedback via printed reports, to CD-ROM based multi-media programs, to computer kiosks, and now via the web. Web-based CTIs are particularly beneficial for intervening with some mental health issues because they offer anonymity[29,30], reduce fear of stigma, and increase self-disclosure[31,32]. CTIs can be more engaging, allowing participants to control their learning environment, move at their own pace, and allow access to sensitive information[33–35]. They can also potentially increase retention rates by increasing convenience and allowing doses of interventions as needed[36]. Additionally, advanced CTIs employ empirical databases consisting of data collected from thousands of participants and heuristics. These databases provide the basis for decision rules that guide the development of individualized interventions tailored according to behavior-change theory variables[16,37].

The web is identified as being the most powerful channel for delivering feedback, offering the most access to expert guidance, and holding promise for boosting efficacy of CTIs. Lustria[38] reviewed key components of 30 existing CTIs delivered over the web. They found that there is a great range in what CTIs include, from simple screening tools to more complex theory based tailoring with iterative assessments. The CTI used in this study is composed of the strongest key components found by Lustria and colleagues[38], including theoretically guided tailoring, dynamic tailoring across multiple contacts, and self-directed delivery.

The theoretical framework upon which the CTI system is based is the Transtheoretical Model of Behavior Change (TTM) — one of the leading behavior change theories[37]. The TTM[39] is a comprehensive model of behavior change that integrates diverse psychological constructs (i.e., stage of change, decisional balance, process of change, and self-efficacy) to explain and predict how and when individuals change their health behaviors. Several clinical trials have documented the ability of TTM interventions to recruit, retain, and effect change across a number of health behaviors, including smoking[40,41], stress[42], depression prevention[43], exercise[44], diet[45], sun exposure[46], alcohol[47], weight management[48], and multiple health behaviors[49–51].

Clinical research that has applied the TTM to Vietnam veterans with PTSD has also shown impacts on readiness to change, perceived treatment relevance, attendance at group treatment sessions, and attrition[52].

TTM-based CTI's have also generated much higher rates of participation (e.g., 65% to 85%) for problems like smoking, stress, and obesity than the 2% to 20% rates commonly found with action-oriented clinic-based treatments (e.g.,[40,42,48–50]). Further, those who traditionally are at greatest risk for dropping out, participants in the precontemplation (PC; not ready to change in the next six months) stage completed CTIs at the same high rate as those prepared to take action. In mandated group therapy for partner abuse, randomly adding three sessions of CTI's nearly doubled the percentages of perpetrators who voluntarily sought appropriate help like couples therapy (50% vs. 24%) or group therapy (36% vs. 18%)[53].

CTIs are a best practice for behavior change science[54] as they are highly individualized to the participant's needs, yet maintain a standardized quality[55]. Tailored communications have been shown to be more engaging, effective in building self-efficacy, and improving health-behaviors than non-tailored communications [38], and useful in producing more acceptable and effective interventions[56,57]. In a 2010 meta-analysis, Krebs et al.[58] found that across 88 CTIs for health behavior change in the areas of smoking, exercise, healthy eating, and mammography screening, a significant effect size was found (g=0.17) — a small to medium effect for population based interventions. As outlined by Hester et al.[59], CTIs require little or no clinician involvement, which can increase feasibility and cost-effectiveness; they can provide personalized feedback in a timely and visually engaging manner; they can deliver feedback more consistently, based on assessment data and decision rules; they can store the data to chart changes over time; and they can be widely disseminated while preserving fidelity. CTIs combine the advantages of a clinic approach (individualized interactions with the goals of a public health approach (targeting large population segments).

A. Procedures

All procedures were approved by the VA Pacific Islands Health Care System (VAPIHCS), the U.S. Army Medical Research and Materiel Command's Human Research Protection Office (HRPO).

A.1 Focus Group

No TTM-based CTIs have been developed specifically for or tailored to Veterans. The focus group for this study, part of a larger project[60], was intended to bridge this gap by evaluating the applicability of an evidence-based CTI to address smoking in Veterans, the results of which may be used for future adaptation.

Participants were recruited from Veteran communities in Hawai‘i, and were screened for eligibility based on criteria outlined in Table 1. Nine Veterans participated in the smoking cessation focus group to evaluate the CTI smoking cessation program.

All procedures were approved by the two institutional review boards involved. The focus group methodology was informed by[61]. Two practice sessions were conducted to familiarize research staff with the procedures and to finalize the protocol. Each focus group began with the informed consent process and completion of a brief assessment, followed by introductory questions and the evaluation of the CTI program using a discussion guide developed for the smoking cessation program. The focus group was led by a trained facilitator, with an assistant facilitator and two note-takers help with the process. The focus group was recorded using an audio device, and lasted approximately two hours. A $25 gift card was provided to each participant at the end of the meeting.

A.2. Usability Testing

After the CTI program had been adapted and beta-tested, its acceptability and usability was examined to provide a scientific assessment of user errors, misunderstandings of content, navigation problems, and subjective satisfaction[62].

Three separate usability tests were conducted for the CTI smoking cessation program using a combination of the Think Aloud protocol[63] and Wizard of Oz approach[64,65]. Briefly, participants were asked for initial reactions to the introduction to the CTI system and program. Participants were then asked to logon to the CTI program, continue through the baseline assessment, and narrate their behavior as they progressed through the program. Usability testing software (Morae®) was used to take notes and record participant interactions with the program, including paths taken, reactions to content and videos, instances of confusion about how to navigate through the web-based multimedia program menu, how long users spent on each exercise, whether assessments are successfully completed, sources of frustration, what aspects of the program seemed to be missing, and overall level of satisfaction. Participants provided

qualitative and quantitative feedback on overall presentation and usability, as well as quality of the program, navigation, ease of use, attractiveness, etc. All interview data were coded, categorized, and summarized in a feedback report so that revisions to the system could be adapted.

Two additional usability interviews were conducted using the same procedures described above to ensure that the revisions made based on the first round of usability testing were adequate. All usability interview participants received a $50 gift card at the end of their particular session as reimbursement for their time and contribution to the study.

A.3. Randomized Control Pilot Trial

After registration with the system, participants were asked to provide their 10-digit cell-phone numbers. Participants who verified their cell phone number by sending an automated response to the system were considered enrolled. At all three timepoints, participants completed a brief Health Risk Intervention (HRI), two additional smoking assessments, and the smoking cessation (SC) intervention. The HRI assessment determined baseline readiness to change for smoking and several other related health behaviors, and the smoking cessation intervention provided assessment and feedback about participants' confidence to quit smoking, decisional balance, and use of various change strategies.

Following the baseline HRI and SC intervention, the CTI system randomized participants into either the treatment group (Tx), who also received the CTI only, or the treatment-plus group (Tx-plus), who received the CTI and tailored text messages. The study was conducted as entirely anonymous. All participants were given three months' access to the web-based CTI system. The Tx participants received only the online feedback narratives/report that all participants received upon completion of the online Smoking Cessation intervention. Tx-plus participants also received individualized text messages on their cell phones 2-5 times per week (the number of messages correlated with the participant's stage of change) that provide expert guidance, encouragement, and reminders that support their smoking cessation efforts. These messages were developed using the empirically derived decision rules of the web-based smoking cessation CTI that were established by comparing each participant's responses on the baseline assessment to a large comparative sample of other individuals in that stage (normative comparisons). The CTI system can generate over 150 unique feedback narratives at baseline and more than 20,000

unique narratives after follow-up assessments. This capability ensures that participants do not receive the same feedback each time they receive a text message from the system.

All text message feedback was stage-tailored, and offered strategies for facilitating the change process relevant for the target behavior. For example, a participant in the Contemplation stage (C) with below average confidence would receive tailored feedback on their level of confidence as well as strategies for boosting their confidence such as setting small goals and asking a friend to encourage them not to use tobacco. An example of an encouraging text message may be "Do something nice for yourself when you take small steps toward quitting, like cutting back on the amount you smoke. Ask a friend to help you."

The follow-up one-month assessment assessed whether participants had progressed or relapsed in their stages of change, confidence to quit using tobacco, decisional balances, or use of strategies for change. In addition to normative feedback, ipsative feedback was provided (compared to self) that reinforced progress the participant had made on the TTM constructs since the baseline smoking cessation assessment, and explained what specific steps the participant could take to progress further. For example, a participant who progressed to the Action stage (A) who was practicing an appropriate amount of reinforcement management for smoking cessation would be advised to keep up the good work, and consider what reinforcements would help him or her to maintain their non-smoking status. Suggestions, such as realizing the health and physical benefits, and including family and friends in their healthy lifestyle, were offered. Tx-plus participants then received stage-matched text message feedback on their cell phones based on the one-month assessment results.

For their participation in the study, all participants received up to $65 in gift cards as reimbursement for their time and effort. They received a $20 gift card after completing the baseline assessment, and another $20 gift card after completing the 1-month assessment measures. Those who completed post-study assessment measures at the conclusion of the active phase of the study (3 months) received a $25 gift card. In addition, Tx-plus participants received an additional $10 in gift cards ($5 gift card per month up to 2 months) to support their text messaging service fees while they are active participants in the research project.

B. Measures

B.1. Demographics. This self-report questionnaire was developed for the project to obtain participant demographic information, including race/ethnicity, age, gender, education, marital status, rank when retired, combat theater(s) served, total number of months in theater(s), smoking history, etc. Participants were also asked to note any other treatments or smoking cessation programs that they have used in the past.

B.2. Health Risk Intervention Survey (HRI). This survey consisted of questions about health behaviors related to smoking cessation. The behavior information was used to assess the participant's stage of change relative to smoking cessation and other smoking-related health behaviors. This included stage of change assessments for exercise, healthy eating, alcohol misuse, stress management, and depression prevention. Participants completed the HRI at each timepoint.

B.3. Fagerström Nicotine Dependence Scale (FTND). The FTND[66] is the most widely used tool for assessing severity of nicotine tolerance and dependence. It is a six-item, self-report scale assessing severity of nicotine tolerance and dependence in smokers. The FTND is modestly correlated with biochemical indicators of exposure to cigarette smoke, including exhaled air carbon monoxide and plasma cotinine. The FTND is correlated with duration of smoking (r=.36), smoking intensity (r=.45), and saliva cotinine (r=.40). Internal consistency for this scale was an average of α=.95 for the three timepoints. Participants completed the FTND at each timepoint.

B.4. Questionnaire on Smoking Urges (QSU). The QSU was used to measure subjective changes in positively and negatively reinforced craving levels in response to smoking stimuli[67]. A brief 10-item version of the QSU was used in this study. Internal consistency for this scale was an average of α=.62 for the three timepoints. Participants completed the QSU-10 at each timepoint**.**

B.5. TTM Smoking Cessation Assessment. This online self-report measure that assessed the four TTM core constructs, i.e., Stage of Change, Decisional Balance, Processes of Change, and Self Efficacy, in relation to smoking cessation. *Stage of Change* (2 items) assessed readiness to quit smoking[68], e.g., "No, I intend to quit in the next 6 months." *Decisional Balance*[69] measured the relative importance of the advantages (pros) and disadvantages (cons) in an individual's decision to quit smoking. Using a 5-point Likert response scale (1=not important; 5=extremely

important), participants rated 6 items on their relative importance, e.g., "Quitting can improve my appearance." Internal consistency was α=.83 for both pros and cons. *Processes of Change*[70] consisted of 445 items that assessed 10 cognitive, affective, experiential, and behavioral techniques used by individuals to facilitate the change process for smoking cessation, e.g., "You made a commitment to quit." Responses were given on a 5-point Likert scale of frequency (1=never; 5=repeatedly). ." Internal consistency for the 10 processes of change scales ranged from α=.61 to .91. The final component, *Self-Efficacy*, (8 items)[71] assessed an individual's confidence level to refrain from smoking even in difficult situations, e.g., "When you have just finished a meal." Confidence level ratings are made on a 5-point Likert scale (1= not at all; 5=extremely confident). Internal consistency for self-efficacy was α=.89. Participants completed the TTM assessment measures at each timepoint.

B.6. User Satisfaction. This 16-item questionnaire was used to obtain user feedback about the CTI intervention materials and is typically used by Pro-Change during the program development process. Twelve items were rated on a 5-point Likert scale from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*) and assessed multiple dimensions of the intervention materials including ease of use, clarity of items and feedback, attractiveness, appropriateness of tailoring, degree of interest and enjoyment, ability to convey information, ability to change attitudes, helpfulness, ability to elicit appropriate action, and credibility. Total possible scores range from 12 to 60, with higher scores indicating higher user satisfaction with the intervention materials. The last four questionnaire items are open-ended questions requesting participants to provide suggestions and criticisms of the intervention materials. Study participants this questionnaire at the end of the study.

C. Data Analysis Plan

C.1. Focus Group Qualitative Analysis (Hypothesis One)

The focus group analysis followed the guidelines recommended by Krueger64</sup>. Immediately after each focus group, the facilitator, assistant facilitator, and note-takers debriefed the process and noted group dynamics. The audio recording was transcribed and all identifiers were removed to protect confidentiality. The transcript created was then compared with the notes to ensure completeness and accuracy. The analysis entailed breaking the transcript into meaning units and then grouping similar meaning units to form themes. To be considered a theme, an idea had to be mentioned at least twice. After extraction of themes, major themes were identified and examined in terms of the applicability of existing CTI programs to Veterans. Particularly, themes specific to Veterans were summarized to direct future adaptation.

C.1 Descriptives (Hypothesis Two)

All statistical analyses were conducted using IBM® SPSS® Version 20.0. Demographics were analyzed using descriptive statistics, frequencies, crosstabs, and t-tests. The significance level for all tests was set at two-tailed $\alpha=0.05$.

C.3 Outcomes Analysis (Hypothesis Two)

All statistical analyses were conducted using IBM® SPSS® Version 20.0. Multivariate Analysis of Variance (MANOVA) was used as the omnibus test for all continuous dependent variables, with stage of change and group assignment acting as the independent variables. Discriminant Function Analysis was used to examine predictors of change for both groups across the three timepoints. Chi-square was used to examine discrete and categorical variables, including stage of change, and other behavioral risk factors.

C.4 User Satisfaction (Hypothesis One)

A review of all quantitative and qualitative feedback provided by participants in the user Satisfaction survey was conducted to determine if the CTI was appropriate and relevant to Veterans. Ratings will also be analyzed by stage of change to determine if positive feedback about the system is associated with progress over time and/or actual behavior change.

RESULTS

A. Participants (Focus Group Only)

Ten Veterans (all male) volunteered to participate in the smoking focus group. One individual did not attend. All participants were male. Table 2 provides a demographics summary.

B. Participants (Usability only)

Five Veterans (all male) volunteered to participate in the usability interviews. Table 3 provides a demographics summary.

C. Participants (RCT only)

A total of 1,174 Veterans registered to learn more about the study. Of those, 268 did not consent to join the study, 48 remained inactive, 95 failed to complete the initial assessment, 39 were removed for providing duplicate phone numbers, 55 were removed for suspicious behavior, 213 did not respond to a verification message, and 2 individuals assigned to the Tx-plus group requested that all text messages be stopped. Of the remaining individuals, 210 were randomized to the Tx-plus group, and 236 were randomized to the Tx group. The following analyses will be conducted on the remaining 446 participants completed the baseline assessment and intervention program.

C.1 Demographics

The sample (n=446) was composed of individuals from all but three U.S. states and Puerto Rico. There were no verified participants from New Hampshire, New Mexico, and Vermont. With the exception of gender ($\chi^2(1)=4.99$, $p<.05$), there were no significant differences between the composition of the Tx and Tx-plus groups. Baseline demographics are provided in Table 4.

C.2 Military Service

The study participants represented all military service branches, with the highest representation from the Army (42.8%). There were no significant differences between the composition of the Tx and Tx-plus groups with regard to military service (see Table 5).

C.3. Smoking History

Almost half (43.3%%) of Veterans started smoking cigarettes after joining the service, and the majority (79.1%) smoked between ½ and 1½ packs per day. The majority of participants had made between 1-5 previous quit attempts (69.1); however, almost 20% had attempted to quit smoking 10 or more times. Average nicotine dependence was "medium," and average urge to smoke was "moderate." Stage of change had a proportionately higher group of individuals in the Contemplation stage than is commonly seen among smokers. Most stages of change studies have found the proportion of smokers to be 40% in Precontemplation, 40% in Contemplation, and 20% in Preparation. This sample appears to have some intention to change, although not in the near future. There were no significant differences between the composition of the Tx and Tx-plus groups with regard to smoking history or scale scores (see Table 6 and 7).

D. Focus Group

In general, participants thought the content of the program was appropriate for Veterans who were having difficulty quitting smoking. They found the concept of stages to be helpful for self-evaluating and stage-tailored feedback encouraging for progress. Participants especially liked aspects of the system that acknowledged their autonomy as Veterans. The individually tailored feedback on processes of change was also considered to help them adopt useful strategies or maintain effective strategies already employed. Many participants believed that the included goal-setting would be very useful in helping them move forward through the stages. In particular, small steps toward specific goals were especially appealing because it increased the manageability of behavior change.

Scientific and user-friendly language each gained some support, with a preference for a combination. They particularly preferred text that is clear, concise, specific, informative, and easy to understand. Most graphics in the programs were considered relevant to the information presented in the corresponding text and helpful for users to better understand the content or feel more positive about changing.

Although the majority of the content was appropriate, some was considered difficult or inappropriate. When reviewing the screenshots, participants had difficulty understanding a couple of professional terms without a definition or explanation, such as "transtheoretical" and "contemplation". They also had difficulty relating to the function of the "pros and cons"

exercise. In addition, they indicated that some benefits (e.g., improvement in appearance) and certain activities (e.g., yoga) in the CTI may not appeal to Veterans. Furthermore, they did not like graphics that triggered combat memories or unhealthy behaviors, including the beach at sunset and cigarettes. They also suggested that helping relationships were a source of stress rather than support for Veterans because of difficulty relating to non-Veteran friends and family members.

Some suggestions for adaptation were proposed during the discussion. Inclusion of more scientific-based information in a user-friendly language was recommended. Providing more Veteran-specific helping strategies was proposed, such as "couples counseling" for post-deployment relationship building and avoidance of isolation for the depression prevention. Participants also suggested that the content of the graphics be consistently related to the written information.

A copy of the Final Analysis Report is attached as Appendix D.

E. Usability Interviews

A brief analysis of the usability video and user feedback found that relevant usability events fell into one of the following four categories:

1. Homepage/Welcome Page issues
2. Errors
3. Suggestions
4. Positive Comments

For example, one usability issue with the Homepage was with the lack of a "Next" button on the page for to prompt forward navigation. Another user wanted additional instructions on what to do to get from the Homepage to the e-Workbook. Other comments included revising the graphic images on the home page (e.g., someone putting out a cigarette). With the exception of the addition of new graphic image, all other suggested changes were made.

Errors that were captured by the usability testing were all user errors that required the user to re-read instructions in order to move forward through the system. For example, a participant received an error indicating that s/he was not a returning user; the participant did

not see the "First Time Registering" link. The instructions to register and create a new user ID were moved to a different location, so that participants could easily find them.

Suggestions for improvement included a preference for more photos throughout the system, confusion about how to answer pros and cons questions, a dislike for the color scheme, a request to reduce the amount of text, a recommendation to add drop down menus to some of the questionnaires. Those suggestions that could be incorporated into the system without compromising the content or requiring a redesign of the GUI were incorporated.

Finally, positive comments often reflected personal tastes, such as liking the color scheme, and liking certain photos. However, more often, positive comments were associated with the content of the system, such as the positive feedback and encouragement, the inclusion of the e-Workbook, the printable feedback report, and the relevance of the program to Veterans.

A copy of the deidentified user comments and summary analysis are attached as Appendix E.

F. Randomized Control Pilot Study

Hypothesis 1: The structure and content of the cell phone-based CTI for smoking cessation will be appropriate and relevant to Veterans.

While data are available only for those participants who completed the study, indications from the User Satisfaction Scale, as well as the open-ended questions, were that Veterans found the CTI and tailored text messages to be both appropriate and relevant (see Table 8). In addition, participants in the Tx-plus group also indicated that the text messages were helpful, timely and useful (see Table 9).

Quantitative analysis of ratings across the stages of change found that 10 of the 31 items had statistically significant mean differences (see Tables 8 and 9). All mean differences could be ascribed to participants in the PC stage of change at three months rating the system lower in some areas than participants in higher stages. This is not entirely unexpected, given that those in

the PC stage of change had no intention of change their smoking behavior, and the items that were significantly different related to successful change.

Hypothesis 2: Cell phone-based CTI will facilitate greater smoking cessation behavior change than assessment only on a web-based CTI.

While 446 Veterans completed baseline, participant retention at the one-month follow-up was approximately 65% (n=290). Individuals were sent text messages reminding them to return to the system to complete the next assessment and intervention. Participants who had not returned to the program after 8 reminders were no longer contacted and were considered inactive. An additional 55 participants became inactive between the one- and three-months follow-ups. Although this is only a 19% attrition rate between one and three months, it represents an overall retention rate of 52.7%.

Unless noted, the remaining analyses will be conducted on those participants for whom there are complete data (n=235). This final sample was evenly split, with 119 Veterans in the Tx-plus group (50.6%), and 116 in the Tx group (49.4%). A selection of summary demographics is presented in Table 10. As previously seen with the baseline completion sample, there were no statistically significant differences between the two groups with the exception of gender composition. Notably, when compared with the baseline sample, there were two statistically significant differences between the Tx groups those who completed baseline only and those who completed the entire study through the three-month follow-up. Those in the Tx group who completed the three-month follow-up were more likely to be female ($\chi^2(2)=6.67$, $p<.05$), and either single or living with a partner ($\chi^2(10)=20.35$, $p<.05$).

Smoking characteristics and scale scores for the sample of completers is displayed in Table 11. There were no differences between scores and stage distribution for the baseline sample when compared with those who completed the study.

F.1. Tx Compared to Tx-plus Outcomes

Several key outcome measures were used to determine whether the addition of text messaging had a significant effect on Veterans' smoking behavior. These measures include stage of change, stage progression, increases in situational self-efficacy, decrease in number of cigarettes per day, nicotine dependence score, and score on smoking urges scale.

Figures 1 to 3 illustrate the changes in stage distribution from baseline to one-month and three-month follow-ups. While the distributions are not statistically significantly different (due to the small sample size), the Tx-plus group appears to progress more quickly to action than the Tx group.

Figure 1. Stage of Change Distribution at Baseline (n=235)

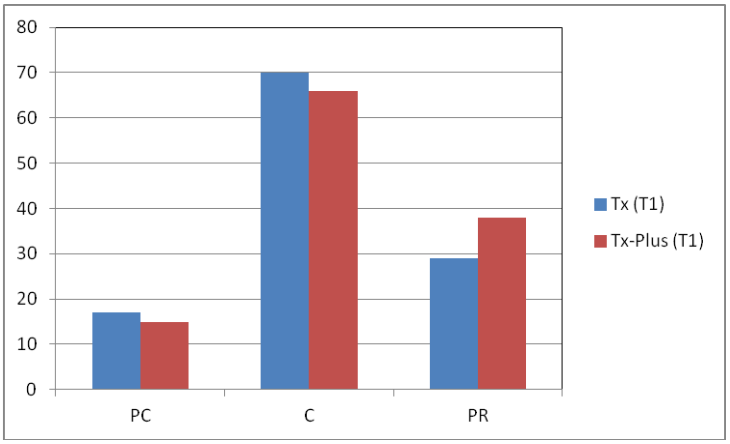


Figure 2. Stage of Change Distribution at One Month (n=235)

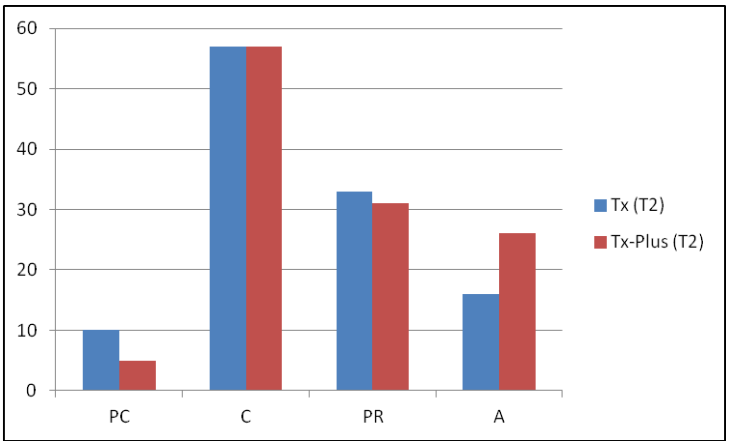
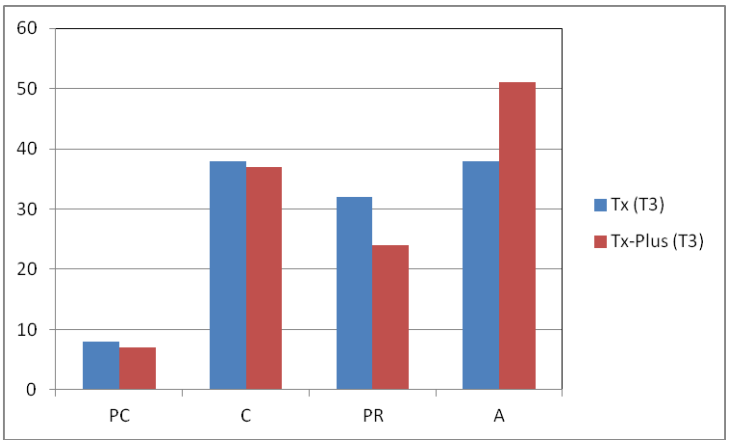


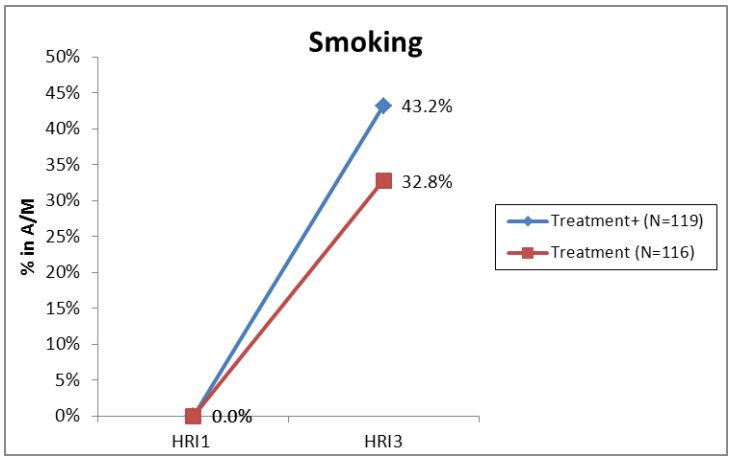
Figure 3. Stage of Change Distribution at Three Months (n=235)



In addition to distributions across stage of change, the difference between smokers who move from risk (either PC, C, or PR stage) at baseline and those who are no longer at risk (A or M stage) is also notable between the two groups. At one month, the proportion of Tx-plus Veterans who were no longer at risk was 21.8%, compared to 13.8% who were no longer at risk in the Tx group. At three months, 43.2% of participants were no longer at risk, compared to 32.8% of the Tx group — a difference of more than 10% (see Figure 4). Although there were no significant differences between the two groups, individuals who quit smoking tended to be younger than those who remained in the PC stage ($F(3,100)=10.97$, $p < .05$, $\eta^2=0.1$). The mean age for individuals who quit smoking was 31.6 (±9.2) years in the Tx-plus group and 31.2 (±6.4) in the Tx group. For those who were in the PC stage at 3 months, the mean age was 40.9 (±13.1) years in the Tx-plus group and 38.3 (±11.4) in the Tx group.

Additionally, from baseline to three months, individuals in the Tx group had a range of stage movement from -2 (regressed two stages) to 2 (progressed two stages); whereas, individuals in the Tx-plus group had a range of stage movement from -1 to 3. This could indicate that the addition of text messages to the intervention helped to reduce recidivism and hasten progress through the stages of change.

Figure 4. Change from Smoking at Baseline to Not Smoking at 3 Months



Changes in smoking behavior were also evident as the number of cigarettes smoked per day decreased across time. The proportion of individuals in both groups who smoked more than one pack of cigarettes per day dropped from 21.3% at baseline to 7.6% at three months. Changes in situational self-efficacy, nicotine dependence and smoking urges were not significant between groups; however, they were significant across time for all completers (see Tables 12 and 13)

Overall, QSU scores decreased from a mean of 44.74 (±14.2) at baseline to a mean of 27.3 (±15.8) at three months (Wilks' λ=.55, p<.05, η^2=.45). Nicotine dependence scores decreased from a mean of 4.62 (±2.2) to 3.28 (±2.2) at three months (Wilks' λ=.67, p<.05, η^2=.33). Situational self-efficacy increased from a mean of 20.59 (±7.3) at baseline to a mean of 28.08 (±8.5) at three months (Wilks' λ=.52, p<.05, η^2=.48).

F.2 Utilization of TTM Constructs

Previous research has determined that there is differential use of various TTM constructs across the stage of change. For example the pros of changing are generally about 1 standard deviation lower in the PC stage than in the A stage; cons of changing are generally about .5 standard deviation higher in PC than in PR; and situational self-efficacy increases about 2 standard deviations from PC to M. In addition, there are specific strategies, or processes of change, that are utilized at various stages of change and can be associated with successful progression or relapse. For example, experiential or cognitive processes of change [i.e., consciousness raising (CR), dramatic relief (DR), environmental reevaluation (ER), self-liberation (SL), and self-reevaluation (SR)] are utilized much more in the early stages of change than are behavioral or

active processes of change [i.e., counter-conditioning (CC), stimulus control (SC), helping relationships (HR), reinforcement management (RM), and social liberation (SO)]. Utilization of various constructs was compared across stages of change and between the two groups (see Table 14).

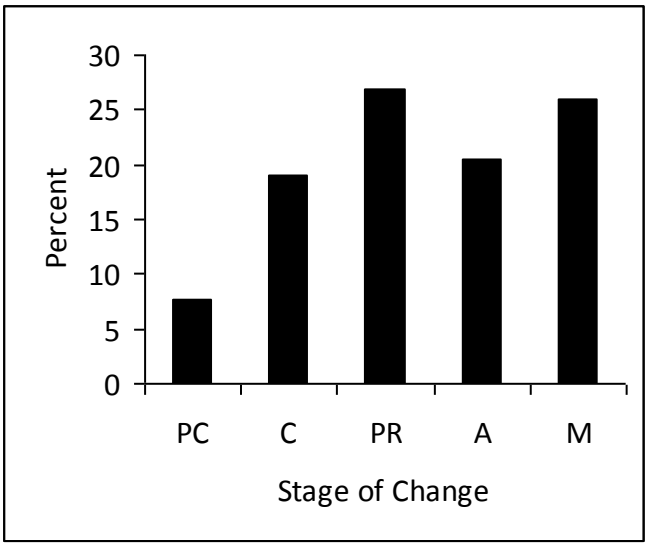
Discriminant Function Analysis was used to determine which TTM constructs were predictive of stage of change at three months' follow-up and stage progression overall between the two groups. The analysis included Pros, Cons, DCBL, and Self-Efficacy scores at one-month follow-up as predictor variables and Stage of Change at three-months as the dependent variable. At one-month follow-up, the four predictors from correctly classified 50.4% of cases at three-months' follow up in the Tx-plus group and 44.0% of those in the Tx group. These same predictors at three months correctly classified 63.9% of those in the Tx-plus group 56.9% of those in the Tx group.

Stepwise linear multiple regressions were used to determine which TTM variables accounted for the most variance across stage of change and number of cigarettes smoked per day (main outcomes) for each group. Both DCBL and self-efficacy at one-month and three-months were regressed separately on to the main outcomes variables at three-months. For both groups only self-efficacy at one month was a significant predictor of stage of change at three months (Tx-plus: $\underline{F}(1,112)=26.89$, $\underline{p}<.05$, adj. $R^2=.19$; Tx: $\underline{F}(1,104)=21.33$, $\underline{p}<.05$, adj. $R^2=.16$). Only self-efficacy at one month a significant predictor of number of cigarettes smoked at three months (Tx-plus: $\underline{F}(1,112)=19.0$, $\underline{p}<.05$, adj. $R^2=.14$; Tx: $\underline{F}(1,104)=14.5$, $\underline{p}<.05$, adj. $R^2=.11$). Similarly, only self-efficacy at three months was a significant predictor of stage of change across groups (Tx-plus: $\underline{F}(1,110)=71.4$, $\underline{p}<.05$, adj. $R^2=.39$; Tx: $\underline{F}(1,103)=43.9$, $\underline{p}<.05$, adj. $R^2=.29$), and the only significant predictor of number of cigarettes smoked at three months (Tx-plus: $\underline{F}(1,110)=58.2$ $\underline{p}<.05$, adj. $R^2=.34$; Tx: $\underline{F}(1,103)=29.17$, $\underline{p}<.05$, adj. $R^2=.21$).

Co-Action Findings

In addition to smoking, stage of change was assessed at all three timepoints for exercise, healthy eating, stress management, depression prevention, alcohol use, and sleep management. Although participants did not receive an intervention on any of these behaviors, change from risk to no-risk was also evident.

Figure 5. Stage of Change Distribution for Exercise at Baseline



More than half of the participants (n=126; 53.6%) were in PC, C or PR at baseline for regular exercise. Of those who were at risk at baseline, 53.1% of those in the Tx-plus group and 47.5% of those in the Tx group moved to the Action (A) or Maintenance (M) stage.

Figure 6. Change from Risk to No Risk From Baseline to Three Months for Exercise

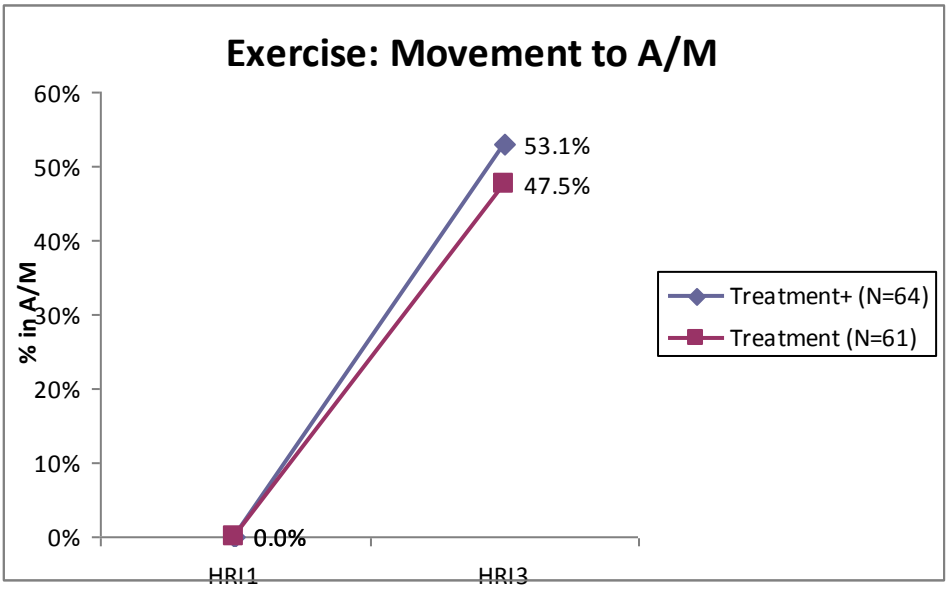
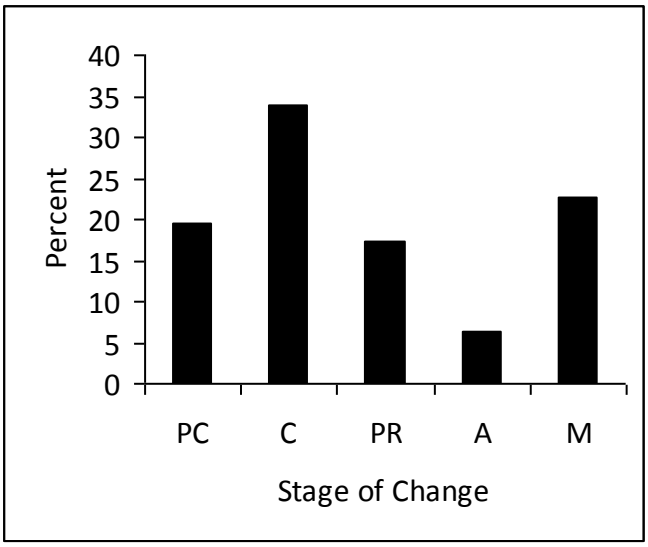


Figure 7. Stage of Change Distribution for Healthy Eating at Baseline



More than 70% of the participants (n=167; 71.1%) were in PC, C or PR at baseline for healthy eating (i.e., eating a low-fat diet and proper caloric intake). Of those who were at risk at baseline,

Figure 8. Change from Risk to No Risk From Baseline to Three Months for Healthy Eating

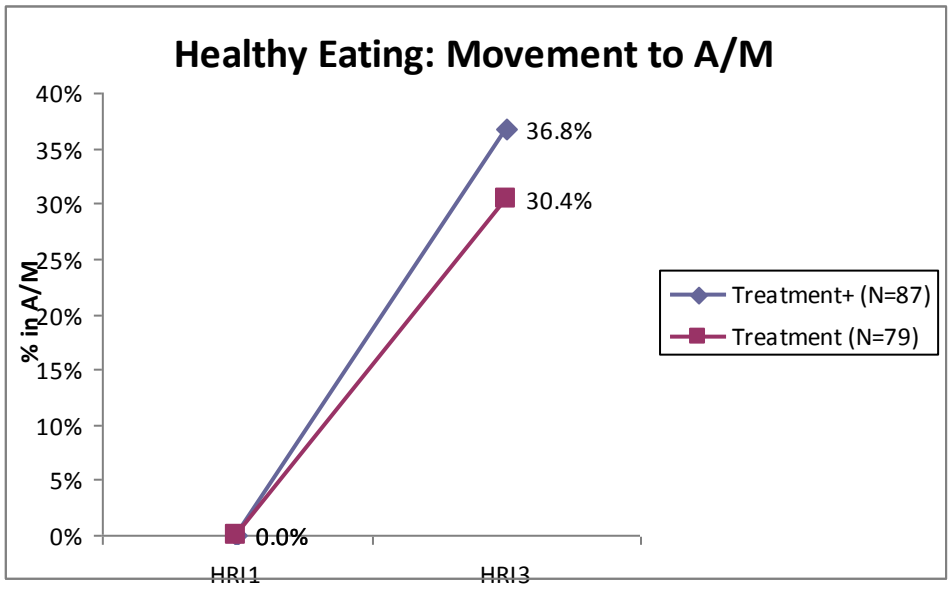
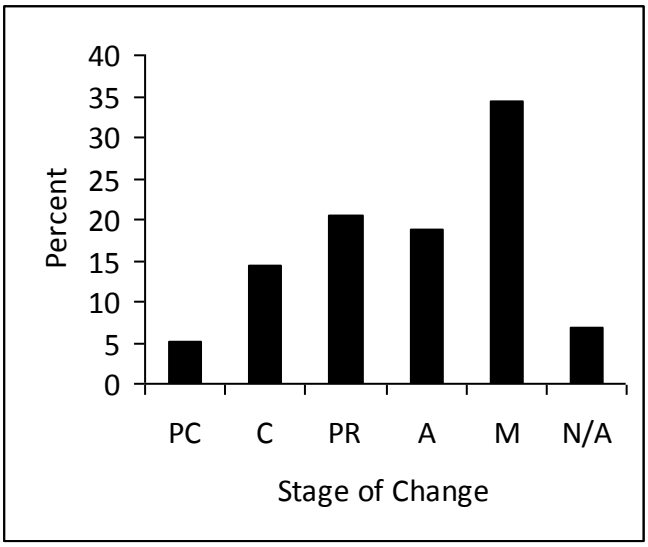


Figure 9. Stage of Change Distribution for Stress Management at Baseline



Forty percent of participants (n=94) were in PC, C or PR at baseline for stress management. Sixteen participants indicated that they had no stress in their life. Of those who were at risk at baseline, 72.1% of those in the Tx-plus group and 59.5% of those in the Tx group moved to the A or M stage.

Figure 10. Change from Risk to No Risk From Baseline to Three Months for Stress Management

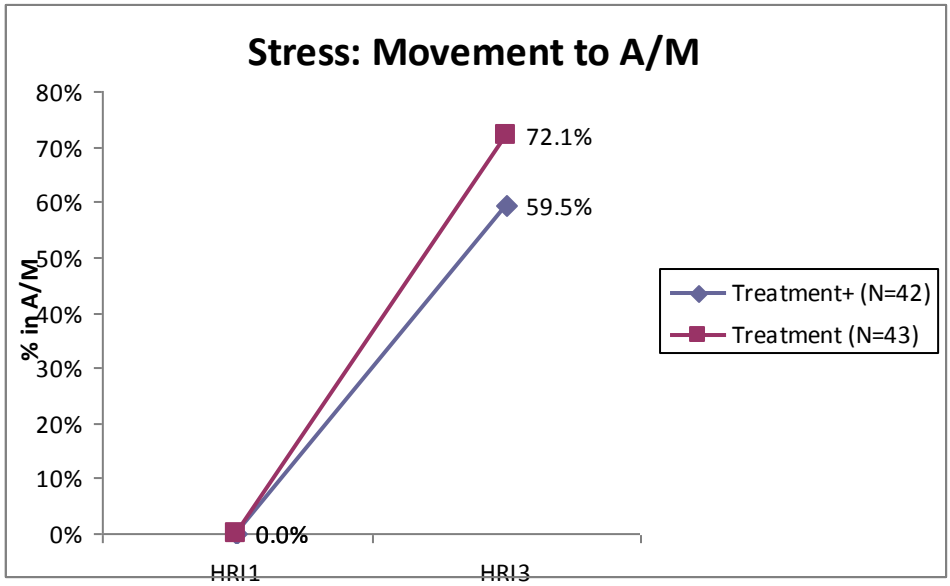
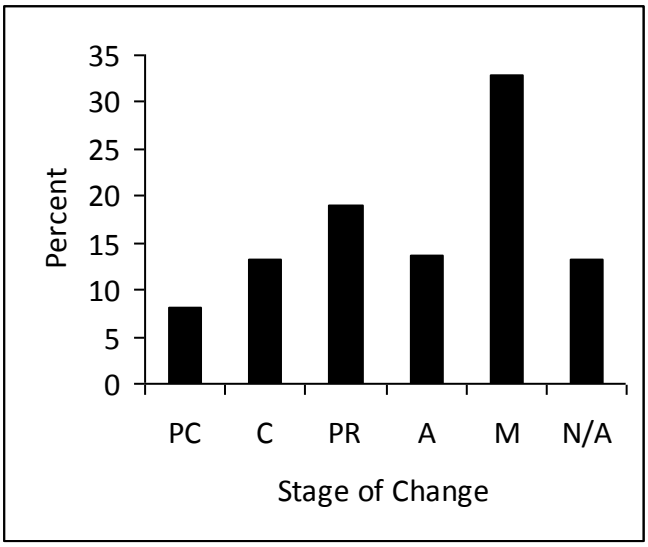


Figure 11. Stage of Change Distribution for Depression Prevention at Baseline



About 40% of participants (n=95; 40.4%) were in PC, C or PR at baseline for depression prevention. Thirty-one participants indicated that they had never been depressed. Of those who were at risk at baseline, 62.2% of those in the Tx-plus group and 39.5% of those in the Tx group moved to the A or M stage.

Figure 12. Change from Risk to No Risk From Baseline to 3 Months for Depression Prevention

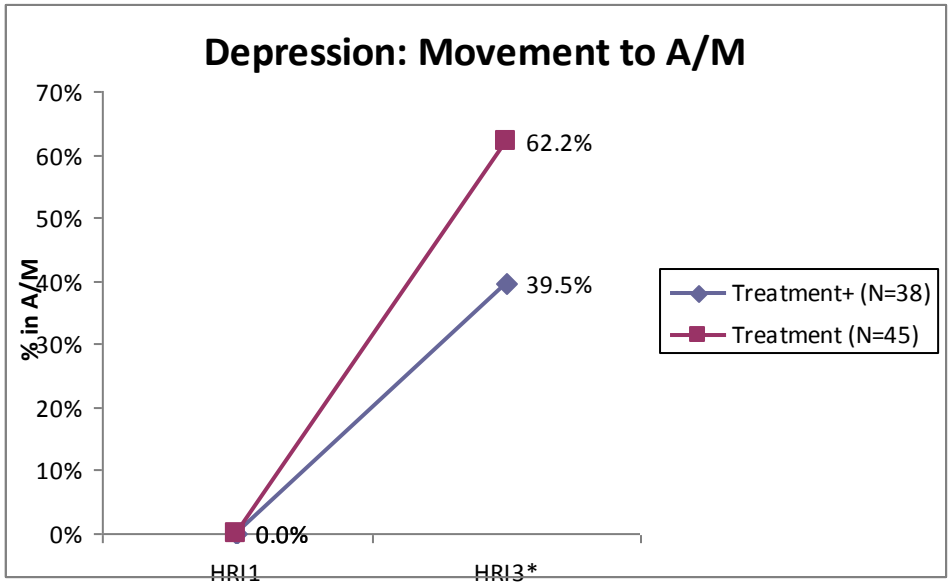
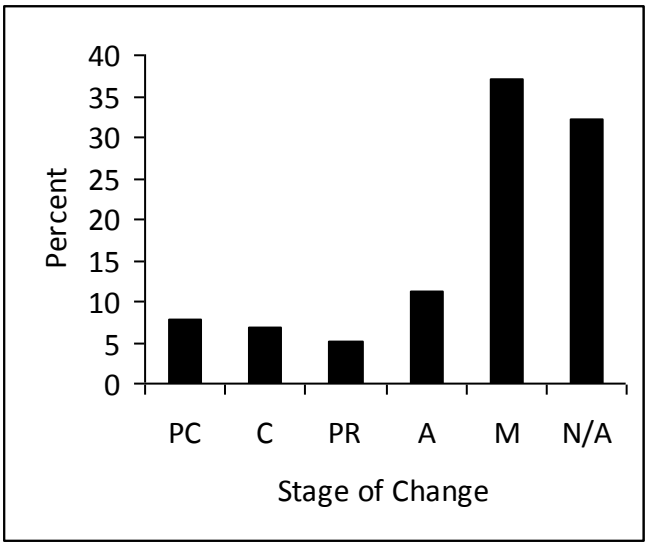


Figure 13. Stage of Change Distribution for Alcohol Misuse at Baseline



About 20% of participants (n=46; 19.6%) were in PC, C or PR at baseline for alcohol misuse. Notably, 76 (32.3%) participants indicated that they had had no alcohol in the past 30 days. Given that almost half of participants indicated that they were in A or M for alcohol misuse (n=113, 48.1%), it's possible that some of those who did not consume alcohol in the past 30 days were in treatment for alcohol abuse. Of those who were at risk at baseline, 60.0% of those in the Tx-plus group and 53.3% of those in the Tx group moved to the A or M stage.

Figure 14. Change from Risk to No Risk From Baseline to 3 Months for Alcohol Misuse

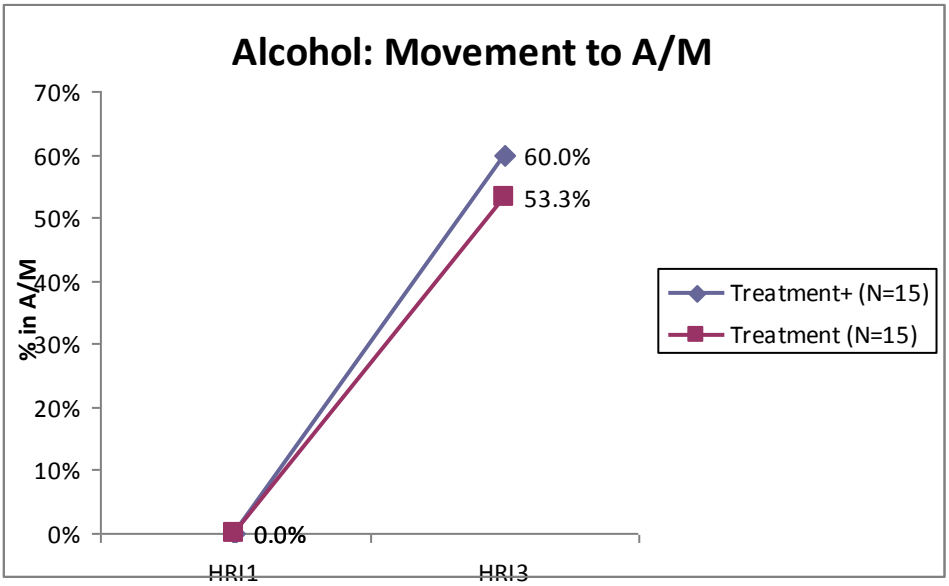
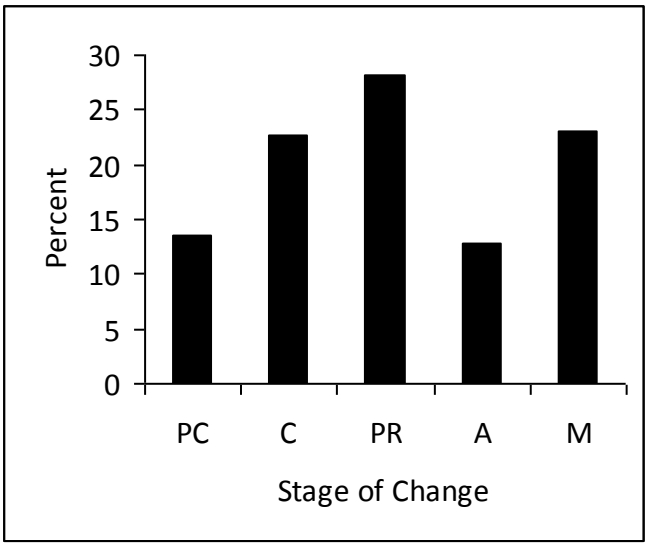
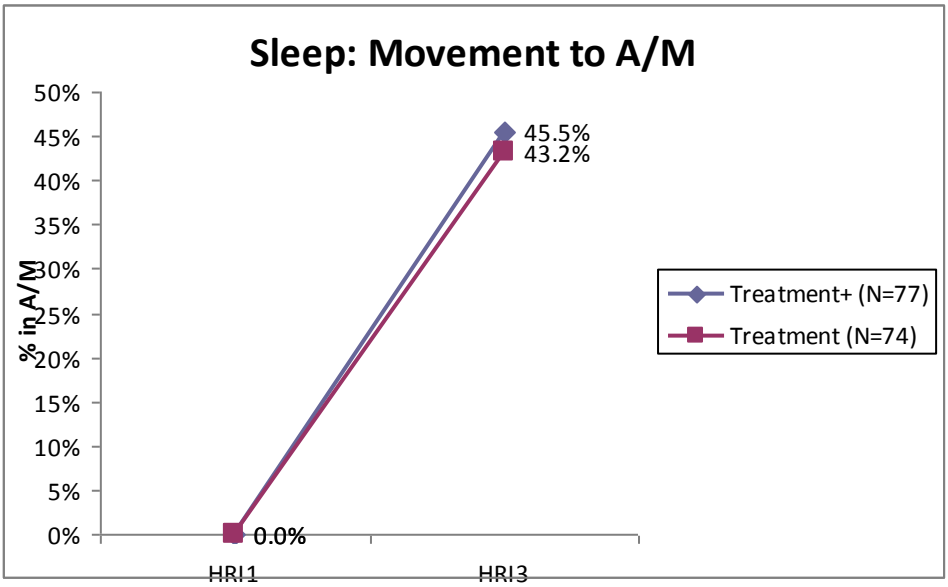


Figure 15. Stage of Change Distribution for Sleep Problems at Baseline



Almost two-thirds of participants (n=151; 64.3%) were in PC, C or PR at baseline for sleep problems. Of those who were at risk at baseline, 45.5% of those in the Tx-plus group and 43.2% of those in the Tx group moved to the A or M stage.

Figure 16. Change from Risk to No Risk From Baseline to 3 Months for Sleep Problems



Together these findings suggest that while participants in both groups were capable of multiple behavior change, those in the Tx-plus group had accelerated progress through the stages of change.

KEY RESEARCH ACCOMPLISHMENTS

1. Human use approvals by both local IRB and ORP/HRPO.
2. Approved modifications to change PI (from Omizo to Miyahira)
3. Pending modifications to change PI (from Miyahira to Jordan).
4. Research Project Manager and Research Assistant hired.
5. Subaward (to Pro-Change Behavior Systems), consultant contracts and CRADA signed.
6. Study team kick off meeting conducted with Pro-Change Behavior Systems.
7. Approval of online participant informed consent process.
8. Study Phase 1 successfully completed: adapting the web-based CTI to support text messaging, tailor the system interface and language to Veterans, and modify the web-based feedback messages to cell phone text messages.
9. Study Phase 2 successfully completed: Beta and Usability Testing of the modified and tailored CTI.
10. Awarded 6 months No Cost Extension to compensate for the 11 months the project was delayed before the current study team was involved.
11. Study presented on invitation to the National Center for PTSD.
12. Endowment gift awarded from the Pacific Health Research and Education Institute to add a supplement study, recruiting additional female study participants.
13. Study Phase 3 successfully completed: 235 study participants completed the study.
14. Study team data analysis meeting conducted with Pro-Change Behavior Systems.
15. Data analyses completed.
16. Outcome paper, journal manuscripts, and conference presentations prepared.

REPORTABLE OUTCOMES

Publications

1. **Jordan, P. J.,** Lid, V., & Evers, K. E. (2012). Cell phone-enhanced expert systems to promote smoking cessation in veterans. (Manuscript in preparation.)
2. **Jordan, P. J.,** Lid, V., & Evers, K. E. (2012). Gender differences in smoking cessation outcomes in veterans. (Manuscript in preparation.)

Presentations

1. **Jordan, P. J.,** Lid, V., & Evers, K. E. (2012). Cell phone-enhanced expert systems to promote smoking cessation in veterans. Paper accepted for presentation at the 16th Annual International meeting and Exposition of the American Telemedicine Association in San Jose, CA, April 29-May 1, 2012.
2. **Jordan, P. J.,** King, L. A., Lid, V., Evers, K. E., & Nigg, C. R. (2012). Stage of change for multiple behaviors in veterans with and without PTSD. Poster accepted for presentation at the 33rd Annual Meeting and Scientific Sessions of the Society of Behavioral Medicine, New Orleans, LA, April 11-14, 2012.
3. Nigg, C., Huang, Y., **Jordan, P. J.,** Burke, K., Kawasaki, M., Evers, K., King, L., Daly, S., & Spira, J. (2012). Using focus groups with veterans to identify issues to adapt a computerized tailored intervention to Address PTSD related behavioral risk factors. Paper accepted for presentation at IADIS International Conference e-Society 2012, Berlin, Germany, March 10-13, 2012.
4. **Jordan, P. J.**, King, L., Lid, V. (2011). A web-based methodology for promoting health behavior change in Veterans with PTSD-related comorbidities. Presentation to the National Center for PTSD, PTSD Research Group, 18-August-2011, via videoteleconference.

Awards

Endowment gift awarded from the Pacific Health Research and Education Institute to add a supplement study, recruiting additional female study participants.

CONCLUSION

In conclusion, the evidence-based CTI is generally applicable to recent Veterans returning from Iraq and Afghanistan. Some minor modifications can be made to further tailor the programs to Veterans' specific needs. As a group, Veterans have a distinctive sociodemographic profile (Koepsell, 2002). Examining the mental health effects in recent Veterans returning from Iraq and Afghanistan has been of increasing importance, particularly since research has shown that deployment and exposure to combat result in increased risk of PTSD, major depression, substance abuse, alcohol misuse, functional impairment, and increased use of health care services (Hoge, et al., 2006; Hoge, et al., 2007).

This study was able to demonstrate that the TTM is an appropriate model to promote multiple behavior change in Veterans. Furthermore, the addition of tailored text messages increased the effect of the smoking cessation intervention (CTI) and improved quit rates in the Tx-plus group to levels that are unprecedented in the literature. Additionally, individuals who were at risk for other health behaviors progressed to A or M without intervention.

For Veterans who are not ready for in-person psychotherapy, have practical issues attending therapy sessions, or fear stigma associated with seeking mental health care, this Veteran-tailored, motivational enhancement CTI may provide unique benefits. In addition, Veterans who smoke and have comorbid behavioral risk factors may find this CTI sufficient to resolve their problems. In this sense, the adapted CTI will make evidence-based mental health care more accessible to Veterans in need without adding concerns about stigma and costs.

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Table 1. Eligibility Criteria for Focus Group Participants

Eligible Individuals	Ineligible Individuals
1. Veterans age 18+ years	1. History of mania, schizophrenia, other psychoses, or active substance use
2. Iraq or Afghanistan service experience preferred	2. Special medical conditions that may prevent engagement with the CTI program, such as history of significant head injury
3. Computer literacy at the beginner level or higher	3. Suicidal ideation
4. Cigarette smoker	4. Severe PTSD symptoms
5. Mild to moderate PTSD symptoms	5. Severe depressive symptoms

Note. PTSD=posttraumatic stress disorder. CTI=computerized, tailored intervention.

Table 2. Demographics Collected on Focus Group Participants (n=9)

Demographics	**(N=9)**
Mean Age in Years (Range)	54.4 (45-68)
Branch	
Air Force	3 (33.3%)
Army	4 (44.4%)
Marines	2 (22.2%)
Navy	0 (0%)
Mean Months Served (Range)	66.11 (8-240)
Ethnicity	
African American	1 (11.1%)
Hispanic/Latino	0 (0%)
Pacific Islander	5 (55.6%)
Caucasian	3 (33.3%)
Marital Status	
Never Married	3 (33.3%)
Married	1 (11.1%)
Separated	2 (22.2%)
Divorced	3 (33.3%)
Living with Partner	2 (22.2%)
Has Children	3 (33.3%)
Education	-----
Some High School	1 (11.1%)
High School/GED	5 (55.6%)

Table 3. Demographics Collected on Usability Interview Participants (n=5)

Demographics	**(N=5)**
Mean Age in Years (Range)	50.0 (36-63)
Branch	
Army	2 (40%)
Navy	3 (60%)
Mean Months Served (Range)	50.0 (24-94)
Ethnicity	
Asian	1 (20%)
Native American/ Alaskan Native	1 (20%)
White/Caucasian	3 (60%)
Marital Status	
Never Married	2 (40%)
Divorced	3 (60%)
Living with Partner	0 (0%)
Education	
Some College	3 (60%)
Graduate Degree	2 (40%)

Table 4. Baseline Participant Demographics (n=446)

Demographics	ASSIGNED GROUP					
	Treatment-Plus		Treatment		Total	
Gender*	**N**	**%**	**N**	**%**	**N**	**%**
Male	128	61.0	190	50.4	247	55.4
Female	82	39.0	117	49.6	199	44.6
Ethnicity						
White, non-Hispanic	160	76.2	173	73.3	333	74.7
Black, non-Hispanic	15	7.1	28	11.9	43	9.6
Asian American	2	1.0	8	3.4	10	2.2
Native Hawaiian, Other Pacific Islander	5	2.4	3	1.3	8	1.8
American Indian, Alaska Native	5	2.4	2	0.8	7	1.6
Hispanic	20	9.5	17	7.2	37	8.3
Other	3	1.4	5	2.1	8	1.8
Marital Status						
Single, never married	40	19.0	48	20.3	88	19.7
Living with a partner	19	9.0	24	10.2	43	9.6
Married	95	45.2	108	45.8	203	45.5
Separated	8	3.8	9	3.8	17	3.8
Divorced	43	20.5	44	18.6	87	19.5
Widowed	5	2.4	3	1.3	8	1.8
Education						
Less than HS	3	1.4	2	0.8	5	1.1
High School	31	14.8	32	13.6	63	14.1
Some College	117	55.7	131	55.5	248	55.6
College Graduate	49	23.3	62	26.3	111	24.9
Postgraduate	10	4.8	89	3.8	19	4.3
Age						
M (SD)	38.54	(11.6)	37.18	(10.4)	37.82	(11.0)
Range	20-68		20-65		20-68	

* $p < .05$

Table 5. Baseline Military History (n=446)

Military History	ASSIGNED GROUP					
	Treatment-Plus		Control		Total	
Military Service Branch	**N**	**%**	**N**	**%**	**N**	**%**
Army	95	45.2	96	40.7	191	42.8
Marines	22	10.5	32	13.6	54	12.1
National Guard	12	5.7	13	5.5	25	5.6
Navy	25	11.9	48	20.3	73	16.4
Airforce	22	10.5	20	8.5	42	9.4
Coast Guard	1	0.5	1	0.4	2	0.4
Other	1	0.5	3	1.3	4	0.9
Combination	32	15.2	23	9.7	55	12.3
Rank at Discharge						
Enlisted	103	49.0	120	50.8	223	50.0
Senior Enlisted	100	47.6	114	48.3	214	48.0
Officer	7	3.3	2	0.8	9	2.0
Years in Military						
M (SD)	9.20	(7.22)	8.37	(6.51)	8.76	(6.86)
Range	0.5-35.9		0.6- 33.3		0.5-35.9	

Table 6. Baseline Smoking History (n=446)

Smoking History	ASSIGNED GROUP					
	Treatment-Plus		Control		Total	
Started Smoking	**N**	**%**	**N**	**%**	**N**	**%**
Before joining service			130	55.1	253	56.7
During boot camp	123	58.6	24	10.2	47	10.5
After boot camp	23	11.0	50	21.2	94	21.1
After deployment	18	8.6	28	11.9	46	10.3
After discharge	2	1.0	4	1.7	6	1.3
Number of daily cigarettes						
10 or less	27	12.9	32	13.6	59	13.2
11-20	143	68.1	152	64.4	295	66.1
21-30	25	11.9	33	14.0	58	13.0
31+	15	7.1	19	8.1	31	7.6
Number of quit attempts						
0	11	5.2	11	4.7	22	4.9
1-3	89	42.3	97	41.1	186	41.7
4-5	46	26.7	66	27.9	122	27.4
6-9	11	5.3	23	9.8	34	7.6
10 or more	43	20.5	39	16.5	82	18.4
In addition to cigarettes, also smoking/using...						
Pipe	10	4.8	14	5.9	24	5.4
Cigar	38	18.1	45	19.1	83	18.6
Cheroot	3	1.4	1	0.4	4	0.9
Hookah	16	7.6	14	5.9	30	6.7
Bidis	1	.5	2	0.8	3	0.7
Kreteks	3	1.4	10	4.2	13	2.9
Snuff	6	2.9	5	2.1	11	2.5
Chewing tobacco	11	5.2	10	4.2	21	4.7
Dip	17	8.1	13	5.5	30	6.7
Snus	10	4.8	12	5.1	22	4.9
Spouse/partner smokes						
No	84	40.0	104	44.1	188	42.2
Yes	76	36.2	73	30.9	149	33.4
N/A	50	23.8	59	25.0	109	24.4

Table 7. Baseline Scale Scores (n=446)

Smoking Scales	ASSIGNED GROUP Treatment-Plus		Control		Total	
FNDS Score						
Mean (SD)	4.9	(2.1)	4.7	(2.2)	4.8	(2.1)
Range	0-10		0-10		0-10	
QSU Scale Score						
Mean (SD)	43.7	(15.0)	43.6	(14.2)	43.7	(14.6)
Range	10-70		10-70		10-70	
Stage of Change for Smoking Cessation						
Precontemplation	27	12.9	26	11.0	53	11.9
Contemplation	129	61.4	152	64.4	281	63.0
Preparation	54	25.7	28	24.6	112	25.1

Note. FNDS = Fagerström Nicotine Dependence Scale. QSU = Questionnaire for Smoking Urges.

Table 8. Results for Quantitative Evaluation Questions (n=235)

Evaluation Questions (All Participants)	**Rating (%)**		
	Strongly Disagree and Disagree	**No Opinion**	**Agree and Strongly Agree**
The program was easy to use.	2.55	5.11	**92.34**
The questions were easy to understand.	1.70	6.38	**91.91**
The personal feedback was easy to understand.	1.70	6.38	**91.91**
I like the overall look of the program.	3.83	7.23	**88.94**
The program was made for people my age.	1.28	15.74	**82.98**
The personal feedback was interesting.	2.55	11.91	**85.53**
I enjoyed using the program.	4.68	11.06	**84.26**
The program gave me new things to think about.*[a]	3.40	8.94	**87.66**
The program could help me be healthier.	4.68	7.23	**88.09**
The program made me consider changing my smoking habits.*[d]	5.11	7.23	**87.66**
I would like to use this program again in the future to see if/how I've changed.*[a]	4.68	13.62	**81.70**
I would recommend this program to a friend.*[a]	2.55	11.91	**85.53**
Overall, I feel this program helped me achieve the results I wanted.*[b]	5.53	26.38	**68.09**
I would like to be able to use this program more often.	5.96	22.98	**71.06**
I found the program too complex.*[b]	**70.64**	11.91	17.45
I think the support of a technical person would have helped me better use this program.*[b]	**52.77**	29.36	17.87
I thought this program was too confusing to use.*[b]	**79.57**	11.91	8.51
I think that most people could learn to use this program very quickly.	1.70	10.64	**87.66**
I found the program very difficult to use.	**81.70**	10.64	7.66
I felt very confident using the program.	1.28	14.04	**84.68**
I need to learn a lot of things before I could benefit from this program.	**64.68**	18.72	16.60

Note. * $p < .05$ by stage of change. a=precontemplation < contemplation only. b=precontemplation < action only. c=precontemplation < contemplation, preparation and action. d=precontemplation < contemplation and action.

Table 9. Results for Evaluation Questions of text Messages (n=119)

Evaluation Questions (Tx-plus group only)	**Rating (%)**		
	Strongly Disagree and Disagree	**No Opinion**	**Agree and Strongly Agree**
The text messages were easy to understand.	1.68	7.56	**90.76**
The text messages arrived at times when it was good for me to receive them.	17.65	10.92	**71.43**
The text messages helped me move towards quitting smoking.*[a]	9.24	18.49	**72.27**
Getting text messages was annoying.	**52.94**	22.69	24.37
I would have liked more text messages from the program.	34.45	31.93	33.61
I didn't read the text messages from the program.	**84.03**	6.72	9.24
I found the text messages difficult to understand.	**86.55**	5.04	8.40
I liked receiving the text messages from the program.	9.24	21.85	**68.91**
The texting reinforced what I learned from the online program.	6.72	13.45	**79.83**
The text messages gave me new things to think about in terms of my smoking.	10.92	10.08	**78.99**

Note. * $p < .05$ by stage of change. a=precontemplation < contemplation, preparation and action.

Table 10. Demographics for Completers (n=235)

Demographics	ASSIGNED GROUP					
	Treatment-Plus		Treatment		Total	
Gender*	**N**	**%**	**N**	**%**	**N**	**%**
Male	72	60.5	50	43.1	122	51.9
Female	47	39.5	66	56.9	113	48.1
Ethnicity						
White, non-Hispanic	88	73.9	79	68.1	167	71.1
Black, non-Hispanic	10	8.4	18	15.5	28	11.9
Asian American	1	0.8	7	6.0	8	3.4
Native Hawaiian, Other Pacific Islander	2	1.7	1	0.9	3	1.3
American Indian, Alaska Native	4	3.4	1	0.9	5	2.1
Hispanic	11	9.2	8	6.9	19	8.1
Other	3	2.5	2	1.7	5	2.1
Marital Status						
Single, never married	32	26.9	31	26.7	63	26.8
Living with a partner	12	10.1	15	12.9	27	11.5
Married	46	38.7	52	44.8	98	41.7
Separated	4	3.4	2	1.7	6	2.6
Divorced	23	19.3	15	12.9	38	16.2
Widowed	2	1.7	1	0.9	3	1.3
Education						
Less than HS	2	1.7	1	0.9	3	1.3
High School	16	13.4	14	12.1	30	12.8
Some College	70	58.8	59	50.9	129	54.9
College Graduate	25	21.0	37	31.9	62	26.4
Postgraduate	6	5.0	5	4.3	11	4.7
Age						
M (SD)	37.0	(11.5)	34.7	(9.4)	35.9	(10.5)
Range	22-65		20-64		20-65	

* $p < .05$

Table 11. Baseline Scores for Completers (n=235)

FNDS Score						
Mean (SD)	4.9	(2.2)	4.7	(2.1)	4.8	(2.2)
Range	0-10		0-9		0-10	
QSU Scale Score						
Mean (SD)	45.2	(14.0)	44.2	(14.3)	44.7	(14.1)
Range			10-70		10-70	
Stage of Change for Smoking Cessation						
Precontemplation	15	12.6	17	14.7	32	13.6
Contemplation	66	55.5	70	60.3	136	57.9
Preparation	38	31.9	29	25.0	67	28.5

Note. FNDS = Fagerström Nicotine Dependence Scale. QSU = Questionnaire for Smoking Urges.

Table 12. Comparison of TTM Constructs Between Groups Across Timepoints.

	Tx Group (mean [SD]) (n=116)			**Tx-Plus** (mean [SD]) (n=119)		
	B/L	**T1**	**T3**	**B/L**	**T1**	**T3**
CONSTRUCT						
Pros	22.7 [5.3]	22.2 [5.7]	22.1[b] [5.8]	22.3 [5.2]	21.8 [5.7]	21.3[b] (5.8)
Cons	20.3 [5.1]	19.5 [5.8]	19.1 [6.0]	21.2 [5.3]	20.8 [5.8]	18.6 (6.2)
DCBL	2.4 [6.1]	2.7 [6.6]	3.7 [7.3]	1.11 [6.6]	1.0 [7.1]	2.7 (8.5)
SE	20.9 [7.8]	23.8 [8.2]	27.8 [8.3]	20.4 [7.3]	23.0 [8.2]	27.4 [8.7]
CR	9.0 [3.4]	10.4 [3.2]	11.3 [3.3]	9.7 [2.9]	10.3 [3.4]	11.2 [3.2]
DR	9.0 [3.2]	9.0 [3.1]	9.5 [3.3]	8.2 [2.8]	8.9 [3.2]	9.0 [3.4]
ER	6.8 [2.3]	6.2 [2.3]	8.6[b] [3.6]	5.6 [2.7]	4.4 [1.9]	5.0[b] [2.2]
SL	8.6 [3.3]	9.6 [3.1]	10.5 [3.1]	8.2 [3.1]	9.3 [2.9]	9.6 [3.1]
SR	9.1 [3.5]	9.7 [3.1]	9.9 [3.2]	8.9 [3.1]	9.6 [2.8]	9.9 [3.3]
CC	8.4 [3.3]	9.5 [3.3]	11.4 [3.3]	8.3 [3.3]	9.9 [3.3]	11.1 [3.3]
SC	7.9 [3.5]	8.6 [3.3]	9.4 [3.3]	7.3 [3.2]	8.7 [3.1]	8.8 [3.3]
HR	10.2[b] [3.2]	10.9 [3.4]	11.6 [3.4]	8.4[b] [3.4]	9.8 [3.6]	11.0 [3.7]
RM	8.7 [3.1]	9.6 [3.1]	11.0[b] [3.1]	8.5 [3.1]	9.5 [3.1]	10.6[b] [3.3]
SO	10.9 [2.8]	11.1 [2.9]	11.05 [3.6]	10.7 [3.1]	10.7 [3.2]	11.6 [3.2]

Note. B/L=baseline. T1=One-month follow-up T3=three-month follow-up. DCBL=decisional balance (pros minus cons). SE=self-efficacy. CR=consciousness raising. DR=dramatic relief. ER=environmental reevaluation. SL=self-liberation. SR=self-reevaluation. CC=counter-conditioning. SC=stimulus control. SS=helping relationships. RM=reinforcement management. SO=social liberation.
a=significant difference within group. b=significant difference between group ($p < .05$).

Table 13. Comparison of Scale Scores Between Groups Across Timepoints.

	Tx Group (mean [SD]) (n=116)			**Tx-Plus** (mean [SD]) (n=119)		
	B/L	**T1**	**T3**	**B/L**	**T1**	**T3**
SCALE						
QSU	44.2 [14.3]	34.5[a] [15.5]	25.5 [14.4]	45.2 [14.0]	30.1[a] [14.8]	25.5 (14.4)
FNDS	4.7 [2.1]	3.4 [2.1]	3.3 (2.2)	4.9 [2.2]	3.6 [2.2]	3.5 (2.1)

Note. B/L=baseline. T1=One-month follow-up T3=three-month follow-up. QSU=questionnaire on smoking urges. FNDS=Fagerström nicotine dependence scale. a=significant difference between group ($p < .05$).

Table 14. TTM Constructs Across Time by Stage of Change Within and Between Groups

	Tx Group (mean [SD]) (n=116)							**Tx-Plus** (mean [SD]) (n=119)						
	B/L Stage of Change			**T3 Stage of Change**				**B/L Stage of Change**			**T3 Stage of Change**			
	PC (n=17)	**C** (n=70)	**PR** (n=29)	**PC** (n=8)	**C** (n=38)	**PR** (n=32)	**A** (n=38)	**PC** (n=15)	**C** (n=66)	**PR** (n=38)	**PC** (n=7)	**C** (n=37)	**PR** (n=24)	**A** (n=51)
Pros[a]	18.9[c] [1.2]	23.6 [0.6]	22.6 [0.9]	18.9 [5.0]	22.0 [6.1]	24.7 [4.7]	25.6 [5.3]	16.8[c] [1.3]	22.1 [0.6]	24.8 [.0.8]	13.6 [5.0]	21.8 [5.1]	22.9 [5.7]	25.7 [4.1]
Cons	19.4 [1.3]	20.2 [0.6]	20.8 [1.0]	18.2 [7.4]	20.5 [5.6]	17.6 [5.9]	22.1 [7.0]	20.2 [1.3]	21.9 [0.6]	20.4 [0.8]	17.7 [8.1]	19.6 [5.4]	18.0 [7.1]	20.9 [7.1]
DCBL[a]	-0.5 [7.3]	3.4[c] [5.9]	1.8 [5.1]	0.63 [3.5]	1.5 [6.5]	7.1 [7.7]	3.5 [6.3]	-3.4 [5.6]	0.2[c] [6.1]	4.4 [6.3]	-4.1 [6.4]	2.4 [6.9]	5.0 [10.0]	4.8 [6.9]
SE[a]	N/A	19.4 [7.9]	24.6 [6.1]	N/A	22.0 [6.1]	28.2 [6.2]	32.9 [8.4]	N/A	17.9 [6.2]	24.6 [7.2]	N/A	20.5 [6.6]	26.3 [7.6]	32.9 [6.7]
CR[a]	6.0 [2.4]	N/A	10.8 [2.5]	6.9 [2.9]	10.3 [2.7]	11.6 [2.7]	12.2 [3.1]	7.3 [2.9]	N/A	10.6 [2.3]	7.1 [2.7]	11.3 [1.2]	10.9 [3.0]	11.9 [3.0]
DR[a]	6.6 [2.4]	9.6 [3.1]	N/A	7.1 [2.9]	10.0 [3.2]	11.0*	N/A	6.1 [2.1]	8.7 [2.6]	N/A	5.3 [2.7]	9.7 [3.2]	9.0 [0.0]	N/A
ER	6.9 [2.3]	N/A	N/A	8.1 [3.7]	N/A	N/A	N/A	5.6 [2.7]	N/A	N/A	5.0 [2.2]	N/A	N/A	N/A
SL[a]	4.9 [2.1]	8.6 [3.2]	10.7 [2.3]	7.0 [2.8]	10.0 [2.8]	11.9 [2.8]	N/A	5.7 [3.1]	7.8 [2.7]	10.1 [2.9]	5.3 [2.2]	9.6 [2.7]	11.0 [2.7]	N/A
SR[a]	5.9 [2.6]	9.9 [3.2]	N/A	7.4 [3.5]	10.4 [2.9]	11.0*	N/A	6.0 [2.4]	9.5 [2.8]	N/A	6.1 [1.9]	10.7 [3.1]	8.5 [0.7]	N/A
CC[a]	5.3 [2.1]	8.4 [3.4]	10.3 [2.2]	7.4 [2.6]	9.9 [3.2]	11.5 [2.8]	13.5 [2.1]	5.8 [2.9]	7.9 [3.0]	10.0 [3.0]	5.4 [2.6]	9.5 [3.0]	11.1 [3.1]	13.0 [2.1]
SC[a]	4.6 [2.0]	7.6 [3.5]	10.3 [2.4]	6.1 [3.4]	8.8 [2.9]	10.9 [3.1]	N/A	5.5 [2.6]	6.9 [3.0]	8.6 [3.3]	5.1 [2.3]	8.8 [3.2]	10.0 [3.0]	N/A
HR	N/A	N/A	10.2[b] [3.2]	N/A	11.3 [1.5]	10.5 [3.6]	12.5 [3.2]	N/A	N/A	8.4[b] [3.4]	N/A	9.3 [3.1]	10.4 [4.0]	11.4 [3.6]
RM[a]	5.6 [2.0]	8.8 [3.0]	10.6 [2.2]	6.8 [2.9]	9.7 [2.5]	11.1 [2.7]	13.0 [2.5]	5.7 [2.4]	8.3 [3.0]	9.9 [2.6]	4.9 [1.8]	9.3 [2.7]	10.6 [2.9]	12.4 [2.5]
SO	N/A	N/A	10.9 [2.8]	N/A	10.5 [3.9]	10.5 [3.5]	11.6 [3.6]	N/A	10.7 [3.1]	N/A	N/A	12.0 [2.0]	11.1 [3.4]	11.8 [3.2]

Note. B/L=baseline. T1=One-month follow-up T3=three-month follow-up. DCBL=decisional balance (pros minus cons). SE=self-efficacy. CR=consciousness raising. DR=dramatic relief. ER=environmental reevaluation. SL=self-liberation. SR=self-reevaluation. CC=counter-conditioning. SC=stimulus control. SS=helping relationships. RM=reinforcement management. SO=social liberation.a=significant difference within group between stages. b=significant difference between group, $p<.05$. c=significant interaction effect, $p<.05$. N/A=not assessed. * no standard deviation, n=1.

APPENDICES

APPENDIX A: LIST OF PERSONNEL

Principal Investigator (15%):	Patricia J. Jordan, Ph.D.
Co-Principal Investigator (5%):	Julia Whealin, Ph.D.
Co-Investigator (5%):	James Spira, Ph.D.
Research Project Manager (100%):	Viil Lid, M.S.
Research Assistant (35%):	Stacy Daly, B.S.

APPENDICES

APPENDIX B: STUDY PROGRESS

Year One

During the first year of the project, several delays and personnel changes impacted the anticipated progress. A summary timeline is presented below.

1. August 31st 2009: The project was awarded.
2. November 19th 2009: Protocol was submitted to VA PIHCS.
3. December 17th 2009: Approval of the protocol was received from VA PIHCS IRB.
4. February 3rd 2010: Official change in PI from Dr. Reese Omizo to Dr. Sarah Miyahira received.
5. March 1st 2010: Name change of contracting organization from VARECORP to PHREI approved.
6. April 6th 2010: Approved protocol sent to ORP/HRPO.
7. May 11th 2010: Human Use approvals received from HRPO.
8. July 23rd 2010: Request change in PI from Dr. Sarah Miyahira to Dr. Patricia J. Jordan.
9. August 10th 2010: Budget Reallocation request submitted.

Year Two

During the second year of the project, all team members were hired, study Phases 1 and 2 were completed, and Phase 3 was commenced. A summary timeline is presented below.

10. September 2010: Viil Lid was hired as Research Project Manager.
11. October 2010: Subaward contract between Pro-Change and PHREI was signed.
12. October 2010: Contract for professional services to be provided by Dr. James Prochaska was completed.
13. October 21st – 22nd 2010: Kick-off Meeting for the study team was held at VAPIHCS. The meeting was attended by all local team members, as well as Dr. Kerry Evers and Dr. Jim Prochaska from Pro-Change in Rhode Island.
14. November 2010: The project IT Coordinator position was eliminated as all IT needs for the project are handled by the Pro-Change subaward.
15. November 2010: Stacy Daly was hired as a Research Assistant.
16. November 2010: All team members completed VAPIHCS IRB Informed Consent training.
17. November 2010: Budget Reallocation was approved by the COR and CS.
18. December 2010: An internet domain with security certificates (www.txtresearch.org) was acquired to host the participant online interface to the web-based CTI system.
19. December 2010: A smart phone with telephone, text messaging, and internet subscription was purchased in order to use for focus group recording, cell phone-based system testing, and participant recruitment.

20. January 2011: A Focus Group with Veterans was conducted to gather information and feedback to inform adaptation and tailoring of the web-based CTI and integrated cell phone text messages.
21. January 2011: Study Phase 1 started. The web-based CTI was adapted to support text messaging, the system interface and language was tailored to Veterans, and the web-based feedback messages were modified to cell phone text messages.
22. February 2011: Several amendments to the protocol and other project documents were approved at a full IRB board meeting. These amendments allow us to move the informed consenting process online and automate the sending of cell phone text messages to participants.

    The process of developing and approving these amendments started in October 2010 and involved careful studying of VA policies and several meetings and coordination with VAPIHCS Privacy Officer, VAPIHCS Information Security Officer, VAPIHCS IRB Coordinator, and the Pro-Change technology design and development team to discuss options and solutions.

    As far as we know the VA IRB approval of online informed consent is unprecedented in the nationwide VA system, and is a noteworthy accomplishment by our team. Through our efforts we believe we improved human subject protection, data validity, and research practicability and effectively.
23. February 2011: A CRADA between Pro-Change and PHREI was signed.
24. March 2011: Study Phase 2 started. Beta and Usability Testing of the modified and tailored web- and cell phone-based CTI.
25. March/April 2011: Minor amendments to the protocol and other project documents were approved by the IRB.
26. April 2011: Study Phase 3 launched. The web- and cell phone-based CTI was launched on April 27th 2011, and from through August 2011 various initiatives were commenced in order to recruit study participants.
27. August 2011: Application for a six month No Cost Extension for the project was approved. The POP end date is March 31, 2012.
28. August 18th 2011: The Dr. Jordan and Ms. Lid were invited to present the project at a Video Conference for the National Center for PTSD.
29. August 2011: The project team was awarded an endowment gift from the Pacific Health Research and Education Institute to add a supplement study recruiting additional women participants to offset the gender imbalance in the Veteran population so that we can do a gender comparison with statistical power.

Year Three

During the final 6 months of the project study Phase 3 was completed, study data were analyzed, and the hypotheses were tested. A summary timeline is presented below.

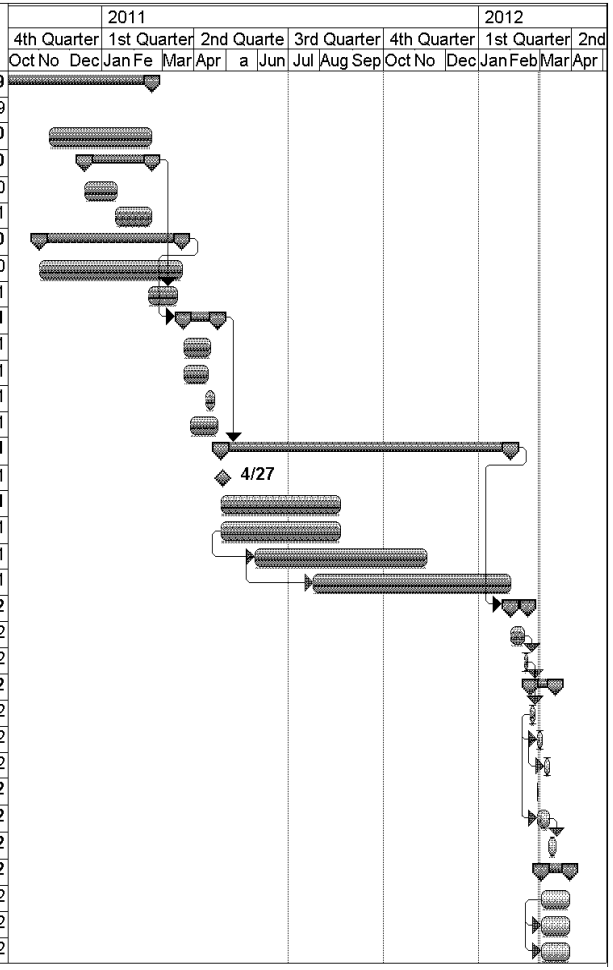
30. September 8th 2011: a protocol amendment was approved by VAPIHCS IRB to allow for recruiting additional participants for the supplement study.
31. October 13th 2011: the second annual continuing review was approved by VAPIHCS IRB.
32. November 11th 2011: Recruitment of study participants ended.
33. January 2012: An abstract by Dr. Patricia Jordan was accepted for presentation at SBM's annual meeting & scientific sessions, April 11-14 2012, New Orleans.

34. January 2012: Abstracts by Dr. Patricia Jordan and Project Manager Viil Lid were accepted for presentation at ATA's annual international meeting & expo, April 29 – May 1 2012, San Jose.
35. February 1st 2012: Study Phase 3 ended. The web- and cell phone-based CTI was closed and the data collection ended. Data cleaning and analysis commenced.
36. February 27th - 28th 2012: Post Intervention Assessment Meetings for the study team were held at VAPIHCS and PHREI. The meeting was attended by all local team members, as well as Dr. Kerry Evers and Julie Padula from Pro-Change in Rhode Island.
37. March 15, 2012: Abstract entitled: "Can text messaging increase smoking cessation rates in Veterans?" was submitted by Dr. Jordan to the International Society for Traumatic Stress Studies for presentation at the ISTSS 2012 Annual Meeting in Los Angeles, CA (Nov. 1-3, 2012).

APPENDICES

APPENDIX C: TIMELINE

ID		Task Name	Duration	Start
1	✓	**IRB Protocols Submission and Approval**	**306 days**	**Thu 12/17/09**
2	✓	IRB Protocol Approval	1 day	Thu 12/17/09
3	✓	IRB Protocol Amendments	**3.6 mons**	**Wed 11/10/10**
4	✓	**Conduct Focus Groups for Adaptation of Web-based CTI**	**47 days**	**Wed 12/15/10**
5	✓	Plan focus group, recruit participants, and conduct focus group	23 days	Wed 12/15/10
6	✓	Transcribe and analyze focus group data	5 wks	Fri 1/14/11
7	✓	**Modify Web-based Feedback Message to Text Messages**	**100 days**	**Mon 11/1/10**
8	✓	Modify Web-based CTI system to support Text Messaging	5 mons	Mon 11/1/10
9	✓	Modify language, tone, and content of feedback narratives for each module	1 mon	Tue 2/15/11
10	✓	**Conduct Beta and Usability Testing on Cell Phone**	**25 days**	**Mon 3/21/11**
11	✓	Conduct beta testing of system	1 mon	Mon 3/21/11
12	✓	Recruit usability testing participants	18 days	Mon 3/21/11
13	✓	Conduct usability testing with veterans	7 days	Mon 4/11/11
14	✓	Modify system based on testing data as needed	1 mon	Mon 3/28/11
15	✓	**Conduct Pilot Study**	**201 days**	**Tue 4/26/11**
16	✓	TUX System Launch	2 days	Tue 4/26/11
17	✓	**Particpant recruitment**	**4.2 mons**	**Tue 4/26/11**
18	✓	Participant consent and baseline assessment	4.2 mons	Tue 4/26/11
19	✓	Conduct 1-month online assessment	6 mons	Sun 5/29/11
20	✓	Conduct 3-month post study assessment	6.85 mons	Mon 7/25/11
21	✓	**Prepare Data**	**13 days**	**Wed 2/1/12**
22	✓	Data cleaning and normalization	2 wks	Wed 2/1/12
23	✓	Data transfer	3 days	Wed 2/15/12
24		**Conduct analyses to test Hypotheses**	**19 days**	**Mon 2/20/12**
25	✓	Non-parametric tests	1 wk	Mon 2/20/12
26		Analysis of variance	1 wk	Mon 2/27/12
27		Mediation analysis	1 wk	Mon 3/5/12
28	✓	**Post Intervention Assessment Meetings (with Pro-Change)**	**0.4 wks**	**Mon 2/27/12**
29		**Interpret results**	**2 wks**	**Mon 2/27/12**
30		**Feasibility Evaluation**	**1 wk**	**Fri 3/9/12**
31		**Submit Final Report**	**20 days**	**Fri 3/2/12**
32		Prepare and submit final report	1 mon	Fri 3/2/12
33		Prepare draft of manuscript for publication	1 mon	Fri 3/2/12
34		Prepare presentation materials for scientific meeting	1 mon	Fri 3/2/12



APPENDICES

APPENDIX D: FOCUS GROUP FINAL ANALYSIS REPORT

STR_2IVE (CTI-PTSD): Smoking Focus Group Analysis

Purpose and Methods

Purpose: This report summarizes the feedback from veterans who have quit smoking that participated in the focus group conducted on 01/14/11 evaluating the smoking expert system provided by ProChange Behavior Systems, Inc.

Recruitment & Participants: The STR_2IVE study team recruited individuals with flyers and word of mouth. Interested participants were screened and if they qualified they were informed of the date and time of the focus group. Confirmation calls were made a day before the focus group. Ten veterans who have quit smoking were recruited and nine participated (one no-show). All were male.

Procedure: The focus group methodology was informed by Morgan (1998). Two practice sessions were conducted to familiarize staff with the procedures and to finalize the protocol. The focus group began with the consenting of the participants, followed by introductory comments and questions, followed by the evaluation of the expert system using a pre-established focus group discussion guide. The focus group was recorded on two tape recorders and a cell phone placed strategically to ensure that all discussion points were captured. The focus group was led by a trained moderator, an assistant moderator was present to take notes on poster paper for recap of points during the focus group, and two note takers were present.

The focus group lasted approximately 2 hours. Food and water were provided during the focus group and participants received a $25 gift card at the end of the focus group as an incentive to participate and to compensate them for their time. Procedures were approved by VAPIHCS IRB and UH IRB.

Analysis: The focus group analysis followed the guidelines recommended by Krueger (1998). Immediately after the focus group, the moderator, assistant moderator, and note takers discussed the group, debriefing and noting group dynamics. Prior to transcribing, all identifiers were removed from the materials to protect confidentiality. All three audio recordings were used to develop the transcript, with the different recordings providing better sound from different parts of the room. The transcript was then compared with the notes taken to ensure completeness. Data from the focus groups were coded and analyzed according to published protocols—which summarize the major themes found from the groups (Albright, Maddock, & Nigg, 2004; Lees, Clark, Nigg, & Newman, 2005; Padula et al., 2003; Pan & Nigg, in press). This entailed breaking the transcriptions into meaning units, then grouping similar meaning units together to form themes. To be considered a theme, an idea had to be mentioned at least twice. Common themes were identified, sorted, and compared.

The results are presented by categories of feedback including *Opening Questions: Health Information,* and then addressing the expert system – *System, Layout, Text, Graphics, and Audience – Issues Specific to Veterans*. Each category has themes which are comprised of specific identified meaning units.

1. Opening Questions: Health Information

Themes	Number of Meaning Units
Benefits of quitting	6
Smoking initiation	2
Support for quitting	15
Barriers to quitting	18

Benefits of quitting (N=6): Participants mentioned health and money, social acceptance, personal hygiene, prolonging life and avoiding property damage. Participants also discussed only being able to smoke in the military at certain times.

Smoking initiation (N=2): Three participants started before basic training and one started after basic training. One participant started smoking after leaving the Marine Corps.

Support for quitting (N=15): Participants indicated the Veterans Administration (VA), their primary care provider, smoking cessation programs, acupuncture, hypnotism, health literature, drugs such as Chantix, and nicotine replacement therapies such as lozenges, patches, gum. Participants also spoke about superiors during active duty requiring smoking cessation.

Barriers for quitting (N=18): Participants listed withdrawals, stress, weight gain, having "nothing to do with your time," habit, coffee and alcohol consumption, side effects from medical interventions, failed attempts at cessation, increased autonomy as veterans, and visual cues that promote smoking behavior.

2. System

Themes	Number of Meaning Units	Slides with Meaning Units (*in descending order)*
Clear	14	7 (N=5), 14 (N=5), 3A/B (N=2), 13 (N=1), 18 (N=1)
Unclear	0	
Like	10	LifeStyle (N=2), LiveWell (N=8)
Dislike	0	
Neutral	1	2A/B (N=1)
Suggestion	3	Closing (N=3)

Clear (N=14): Participants found that the LiveWell format was straightforward. The Stages of Change on slide 7 was also understandable. Participants were able to answer the questions on slide 13 and fill out the blank on slide 14 correctly. On slide 18 they indicated they would be able to set a goal.

Like (N=10): Participants stated that the LifeStyle system "grabs your attention." However, the LiveWell system garnered greater positive feedback. Participants liked its overall aesthetic, clarity, the stages of change and implied credibility ("30 years of research").

Neutral (N=1): One participant had a neutral opinion towards the comparison of the two systems.

Suggestion (N=3): In the closing questions participants discussed friendly vs. scientific language. One stated that it should be a combination of both, another stated scientific if explanations were provided and a third agreed.

> ***SUMMARY:*** *The LiveWell system seems to be the preferred system and the system itself is clear and understandable.*

3. Layout

Themes	**Number of Meaning Units**	**Slides with Meaning Units** (*in descending order)*
Clear	0	
Unclear	1	15 (N=1)
Like	1	3B (N=1)
Dislike	0	
Neutral	1	Closing (N=1)
Suggestion	7	Closing (N=6), 15 (N=1)

Unclear (N=1): One participant was unclear about the status bar.

Like (N=1): One participant preferred the layout of the LiveWell system because it focuses your attention on the words.

Neutral (N=1): One participant articulated that they had no opinion about the layout color scheme.

Suggestion (N=7): One participant thought the LifeStyle system should use green, use more contrasting colors and update the pictures. Two participants suggested a pink color scheme, two suggested green and another suggested blue.

> ***SUMMARY:*** *The main comments about the layout addressed color with green and pink preferred.*

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4. Text

Themes	**Number of Meaning Units**	**Slides with Meaning Units** (*in descending order)*
Clear	36	10 (N=9), 6 (N=6), 9 (N=4), 8 (N=4), 12 (N=3), 14

		(N=3), 7 (N=3), 11 (N=1), 3A/B (N=1), 15 (N=1), 5 (N=1)
Unclear	24	6 (N=11), 9 (N=5), 5 (N=4), 8 (N=3), 3A/B (N=1)
Like	26	4 (N=7), 2A/B (N=4), 8 (N=3), 13 (N=3), 10 (N=3), 18 (N=2), 16 (N=2), 14 (N=1), 3A/B (N=1)
Dislike	5	10 (N=2), 3A/B (N=1), 12 (N=1), 8 (N=1)
Neutral	0	
Suggestion	11	Closing (N=3), 9 (N=2), 6 (N=1), 4 (N=1), 11 (N=1), 5 (N=1), 14 (N=1), 12 (N=1)

Clear (N=36): On slide 2B, three participants felt that the LiveWell system was more direct. On slide 5, the text was clear, on slide 6 the question was clear and the answer choices were clear if you had quit smoking or if you read through all of them first. On slide 7, participants were able to explain the stages of change. On slide 8 they were able to explain the meaning of the text in the paragraph and the bullet points, which they also found thought-provoking. On slide 9, participants were able to correctly explain the instructions in their own words. Participants agreed that the questionnaire on slide 10 was asking you to rate the importance of each item, not whether or not you agreed with it. On slide 11, participants understood the bullet points. Participants' comments about slides 12, 14 and 15 also demonstrated understanding.

Unclear (N=24): On slides 3A/B, one participant commented that "contemplation" might not be a word most people know. On slide 5, several participants were confused by "transtheoretical" and one suggested keeping the text at a 5th grade reading level. On slide 6 several participants found the question misleading and said they would choose more than one answer. On slide 8, participants were not sure how someone could practice to quit. On slide 9 participants found the instructions confusing because they assume that the user knows smoking constitutes a health risk and that that is important.

Like (N=26): On slide 2A, participants liked "at my pace," and on slide 2B, participants liked the stages of change. On slide 3A one participant liked the scientific aspect of the text. On slide 4, participants liked the aspect of personal choice implied in "at your own pace." On slide 8 one participant liked the 24-hour trial suggestion and another liked the suggestion of nicotine replacement therapies. On slide 10 participants found the text "eye-opening" and relatable. On slide 13, participants found the hints and strategies helpful. On slide 14 one participant appreciated the encouraging tone of the text. On slide 16, participants liked the suggestion of asking friends and family for support. On slide 18, one participant liked the information about cutting back on how many cigarettes you smoke and another liked the prompting to decide when to quit.

Dislike (N=5): On slide 3A/B, one participant felt the text was "preaching" at him. On slide 8 one participant said that the number of cigarettes you smoke per day is not as important as how much you enjoy smoking. On slide 10 one participant did not agree with "Quitting can improve my appearance" and "Quitting can make it hard to be around other smokers" because he would quit for himself, not

other people. On slide 12, one participant did not find "I'm not hurting anyone else" believable because everyone has family.

Suggestion (N=11): One participant thought that "at your own pace" was risky because if it were at his pace it would never happen. Another participant felt strongly that the directions should be clearer to choose one answer on slide 6. On slide 9, participants felt that the answer choices "very" and "extremely" were too similar and that, overall, the slide could be simplified. On slide 11, one participant felt that the examples were relatable but not the most important ones. On slide 12, one participant said they would like to see more selection for example, instead of "I'm not old enough" something more along the lines of, "I'm too old and it hasn't killed me yet so hell with it it's too late to quit now." On slide 14, one participant suggested putting non-smoking activities like swimming and running. In the closing questions, participants recommended using more facts and scientific evidence in the text like mortality rates.

SUMMARY: *The majority liked the text, they picked up that it is not forcing you to quit and the strategies and examples used seem to fit well. The main challenge identified with the text was that: a) the stage question needs to be clarified so that it is clear that it means quitting for good and that only one answer should be chosen; and b) possibly adding more examples and strategies.*

5. Graphics

Themes	**Number of Meaning Units**	**Meaning Units** (*in descending order)*
Clear	20	9 (N=5), 14 (N=4), 6 (N=3), 7 (N=2), 4 (N=2), 11 (N=1), 5 (N=1), 16 (N=1), 13 (N=1)
Unclear	24	18 (N=5), 4 (N=4), 8 (N=4), 5 (N=3), 6 (N=3), 14 (N=2), 11 (N=1), 12 (N=1), 15 (N=1)
Like	16	2A/B (N=6), 13 (N=4), 9 (N=3), 11 (N=1), 16 (N=1), 4 (N=1)
Dislike	24	6 (N=5), 5 (N=5), 16 (N=4), 8 (N=4), 11 (N=3), 13 (N=1), 14 (N=1), 4 (N=1)
Neutral	7	11 (N=3), 12 (N=2), 6 (N=1), 18 (N=1)
Suggestion	15	Closing (N=3), 7 (N=2), 15 (N=2), 4 (N=2), 5 (N=2), 11 (N=1), 8 (N=1), 6 (N=1), 18 (N=1)

Clear (N=20): The birds on slide 2A indicated fresh air and freedom. The picture on slide 5 was identified as an EKG to track your heart. The burning cigarettes on slide 6 were associated with the stages of change. The image on slide 7 demonstrated the user's stage of change. The sunset on slide 9 suggested a new beginning, a journey and a destination. The couple on slide 11 looked healthy with good hygiene. The father and son on slide 13 represented a healthy lifestyle. The couple on slide 14 showed a father

and daughter supporting each other and perhaps an older man who had quit smoking to promote life. The image on slide 16 showed confidence.

Unclear (N=24): The birds on slide 4 seemed off topic. The image on slide 5 was difficult to identify as a cigarette. Participants found the image on slide 6 confusing. The image on slide 8 came across as a napkin, not a pack of cigarettes. The image of the man on slide 12 conveyed disappointment. The woman on slide 14 looked like a "gold digger" or a "mistress." The background of the image on slide 15 was unclear and could be a jungle gym, a café or a snack bar. The text in the image on slide 18 was not legible.

Like (N=16): Participants liked the birds on slides 2A and 4, the shadows on slide 2B, the sunset on slide 9, the couple on slide 11, the father and son on slide 13 and the fist on slide 16.

Dislike (N=24): Participants did not like the birds on slides 2A and 4, the EKG on slide 5, the burning cigarettes on slide 6, the crushed cigarettes on slide 8, the couple on slide 11, the father and son on slide 13, the couple on slide 14 and the fist on slide 16.

Neutral (N=7): Participants felt neutral about the couple on slide 11, the man on slide 12, the burning cigarettes on slide 6 and the blackboard on slide 18.

Suggestion (N=15): Participants suggested a tombstone or cemetery on slide 4, showing the filter of the cigarette on slide 5 and showing smokers' lungs or students in cessation classes on slide 7. They also recommended making the box look more realistic on slide 8, showing a person looking in the mirror on slide 11, not using images that trigger smoking behavior like the background on slide 15, making the pictures look more local to Hawaii and making the writing on slide 18 legible. In the closing questions, participants suggested more pictures that depict the impact of smoking on your body.

> ***SUMMARY:*** *Although most participants understood why the graphics/pictures were included, the majority did not like the graphics/pictures because they were ambiguous to some extent, which allowed for negative interpretations. The participants did provide some concrete suggestions as to what pictures or aspects could be changed.*

6. Audience – Issues Specific to Veterans

Themes	**Number of Meaning Units**	**Slides with Meaning Units** (*in descending order)*
Clear	0	
Unclear	0	

Like	10	4 (N=7), 8 (N=3)
Dislike	4	16 (N=4)
Neutral	0	
Suggestion	2	15 (N=2)

Like (N=10): On slide 4, participants noted that they liked the mention of "at your own pace" because it promotes autonomy which, one participant stated, is why they left the military and another said is relatable for veterans who appreciate having greater control over their life. On slide 8, participants agreed that this slide was appropriate for veterans.

Dislike (N=4): Participants did not think that the fist on slide 16 was realistic for veterans, who would be more likely to form a fist with their thumb on the outside of their fingers.

Suggestion (N=2): One participant thought that the slides should be "localized" to reflect veterans' lifestyle in Hawaii.

SUMMARY: *In general the participants felt that this system was appropriate for Veterans.*

References

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Lees, F. D., Clark, P. G., Nigg, C. R., & Newman, P. (2005). Barriers to exercise behavior among older adults: A focus-group study. *Journal of Aging and Physical Activity*, *13*, 23-33.

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Padula, C.A., Rossi, S., Nigg, C., Lees, F., Fey-Yensan, N., Greene, G., & Clark, P. (2003). Using focus groups for instrument development: Application of the transtheoretical model to fruit and vegetable behaviors of older adults. *Journal of Nutrition for the Elderly, 22*, 13-33.

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APPENDICES

APPENDIX E: USABILITY TESTING SUMMARY REPORT

Time	Type	Pos/Neg	User Event	User Event Description	Screen Description
0:03:15	Observation		Structure - layout	Participant said she wasn't sure what to do here. Said "I don't know… register?" and clicked on Register without assistance.	Log-In
0:05:23	Observation			Participant said she doesn't like choosing log-ins, passwords, security questions because she has a bad memory and would have difficulty remembering them. Said this would stress her out but did not have any suggestions for alternatives.	Register
0:07:23	Observation		Content - language (instructions)	Participant asked if the question was asking specifically about "combat" experience or any truama while in the military. Said she would answer "yes" for the former and "no" for the latter. Thought it should say, for example, "combat or non-combat experience".	Screening Questions
0:09:49	Px prompted			Reminded participant to pretend the observers weren't there and that if the participant wouldn't normally read through the Study Fact Sheet then she should't feel obligated to. So participant went straight to "agree".	Study Fact Sheet
0:13:01	Px prompted		Content - language (questionnaire items)	Asked what the participant thought of the questions. Participant said that answering some of the questions were difficult because she really has to think about her feelings or think about the best fitting response based on the available options. She said some just have more complicated answers and has nothing to do with the system/program itself.	Military Experiences
0:17:03	Px prompted		Content - language (response options)	Asked participant what she was currently thinking. Participant said the reponse options could be improved. She suggested "not at all, rarely, sometimes, all the time" would make more sense to her than "not at all, several days, more than half the days, nearly every day." Said the current response options would probably be confusing to veterans.	General Questions (Depression)
0:26:40	Observation		Content - options	Participant said she didn't know which ONE race to choose since she is "half and half." Said it is "irritating" and it should be changed to "all that apply."	Demographic Questions

Time	Type	Pos/Neg	User Event	User Event Description	Screen Description
0:29:32	Px prompted		Content - language (response options)	Asked participant what she thought of this screen. Said that she didn't deploy so she thought there should be an "n/a" or "none" option. Didn't enter anything and went to Next button.	Military Background
0:30:15	Observation		Content - language (questionnaire items)	Participant wanted to know what was considered "dangerous duty" since she wasn't in combat, in order to respond to this item.	Combat Experience
0:31:49	Px prompted		Structure - layout/text.	Asked participant why she moved forward in her chair at this point. Participant said it was because she couldn't tell if the response option said "1 dash 3X" or "13X". When prompted, respondedthat she easily understoon that "X" meant times.	Combat Experience
0:33:55	Observation		Content - language (questionnaire items)	Participant said "rounds" is too specific since lots of other things can happen to veterans e.g., something could fall on them, be in an explosion,e tc. And it doesn't acurately reflect the experiences of veterans. Seems like she felt insulted that it didn't accurately capture other traumatic experiences.	Combat Experience
0:40:48	Error		Error	Participant pressed the Next button before answering any of the items on the screen and got an error message. When prompted, P said she hadn't noticed what she did or the error message. Said she noticed the "red" but not the message itse.f.	Perceived Stress
0:44:28	Px prompted		Content - language (instructions)	Asked participant what she thought about the instructions. Participant said it was confusing and she had to read it 3 times. Said she feels better after having re-read it and thinks it could be reworded. Then she read it several more times.	Quality of Life
0:49:14	Observation		Content - language (response options)	Participant asked "what's the difference between delighted and pleased?" regarding the response options. Said she would change it to "very pleased" and "pleased" or "0 to 5" to make it more clear. (Note: it took her 3 minutes to answer the 1st question.)	Quality of Life

Time	Type	Pos/Neg	User Event	User Event Description	Screen Description
0:53:06	Other - interviewer note		Content - language (questionnaire items)	Participant thought there should be an "n/a" option for "having and rearing children". Didn't connect the instructions to this item even though she read it 10+ times. She got frustrated and selected a random response to move on.	Quality of Life
0:56:40	Observation		Content - language	Participant thought the exercise definition might be too extreme (inaccurate). Said she only does light swimming twice a week which might add up to 2 hours and 30 minutes.	Exercise
0:57:59	Px prompted		Content - language	Asked participant what she thought the purpose of the exercise defition screen was and participant said she had no idea. Participant said she thought it might be trying to make people feel bad if they weren't exercising up to "regular exercise" defitions.	Exercise

Time	Type	Pos/Neg	User Event	User Event Description	Screen Description
0:02:24	Other - interviewer note		Structure - layout	Participant recognized that he was a New User immediately after being reminded to imagine he was doing this program at home alone. No difficulties going to the Register button (old login screen).	Log-In
0:04:09	Other - interviewer note		Technical	Participant enlarged the screen on his own.	Screening Questions
0:10:04	Observation		Content - language	Wasn't sure how to answer some questions as a former sailor. Thought some questions were geared toward soldiers in direct combat situations. He had similar experiences but not exactly like the questions.	Combat Experience
0:11:00	Observation		Content - language	Similar to above issue: he had difficulty responding to item "How often did you fire rounds at the enemy?" since he said he fired "warning shots." Felt it should be considered more than "never" but didn't feel like he was answering the question based on the wording so he ended up selecting "never."	Combat Experience
0:14:55	Other - interviewer note		Content - language	Participant quickly understood that the item about satisfaction with "having and rearing children" also included satisfaction with NOT having them and entered "delighted."	Quality of Life
0:17:15	Observation		Structure - layout; Content - language	Said "there's no answer box…" meaning that he was expecting to answer the Exercise definiton screen. Went to the next screen anyway and answered the question there.	Exercise
0:22:37	Px needed help		Structure - layout/text; Content - language	Looked for "next" button at the bottom of the screen so he wasn't sure what to do when there wasn't one. Thought that what he already did (HRI) was the Smoking Cessation program even though he read the instructions out loud that he was supposed to go to the programs to the left and that the numbers indicated how many times those programs were completed. Ended up to gift card information instead.	Home Page

Time	Type	Pos/Neg	User Event	User Event Description	Screen Description
0:38:31	Observation		Content - language	Wasn't clear what the question was asking regarding how many cigarettes he was willing to decrease each day. Thought it might mean if he selected "2 cigarettes" it would mean on day 2 he would have to decrease it by 4, etc.	Smoking Cessation - Small Steps
0:40:05	Other - interviewer note			Participant wasn't sure what to do next - probably since he thought we had an agenda for what he should work on during the usability testing. When asked, he said that he probably wouldn't have gone to the Report if he was home alone, but went to it anyway "because it's first" (before the Continue button).	Thank You
0:42:08	Other - interviewer note			Participant didn't have any specific comments regarding the Report.	Report
0:42:24	Px prompted		Structure - images/text	When asked, participant said he was primarily paying attention to the text and not the images so none of them stood out to him.	At Thank You
0:43:56	Px prompted		General	Asked participant if he thought this program could help him and he said "Yeah! Actually I'm stoked…" and asked if he could come back to use the program. Informed him that the feasibility study wouldn't be up and running for a few weeks but he could participate in the TUX study now.	At Thank You

Time	Type	Pos/Neg	User Event	User Event Description	Screen Description
0:13:14	Observation		Content - spelling error	Noticed a spelling error. Says "fried" instead of "friend."	Your Level of Confidence (SM)
0:21:21	Observation		Content - language	Said "it's encouraging!" regarding increasing stress management goals (increasing time spent managing your stress in the next month)	Small Steps
0:21:47	Observation		Content - language	Same issue as in SC program - unsure what the question is asking him regarding how many minutes he is willing to increase each day managing stress. (He put the lowest option (i.e., 5 min) because he's interpretting it as he has to increase stress management by 10 min on day 2, 15 min on day 3, etc.)	Small Steps
0:22:52	Px prompted		Content - language	Asked what P thought of the SM recommendations. He said it was good.	At Thank You
0:23:02	Px prompted		Content - language	Laurel asked about adding minutes of SM each day. Participant said it sounded like he had to keep increasing the number of minutes by that number each day and joked that by October he'd have to quit his job because he's be managing his stress all day.	At Thank You
0:38:22	Other - interviewer note		Content - language; Structure - text box	P had a little difficulty with the fill-in-the blank that asked him to "type one thing you've been doing to prevent depression that deserves credit. Then type in how you can reward yourself" and commented that there's only one box so he had to re-read the question a few times.	Your Own Experiences - Reward Yourself
0:42:20	Px prompted		Content - language	Asked P if he thought the DP program would help someone at his SoC (Maintenance). He said "yes" because he thought it was interactive without being judgmental or telling him what to do like a counselor might. He said, as a veteran/out of the military, he doesn't want to be told what to do.	At Thank You

Time	Type	Pos/Neg	User Event	User Event Description	Screen Description
0:02:24	Observation			Wasn't sure if he should register or log-in. Took him about 40 seconds of talking through it until he went to Register without help.	Log-In
0:03:17	Other - interviewer note		Content - language	Participant asked if there was a "demo" for assistance in selecting a log-in, passowrd, etc. (Note: maybe could provide parameters e.g., not case-sensitive, must be at least four characters, etc.)	Register
0:05:07	Observation		Technical	Commented that he had to scroll down to see the last security question.	Register
0:05:56	Error		Error	Read the 1st screening question as "are you in the military" instead of "military veteran" so he selected "no". Asked him how he read that question and then he saw his error. Would have screened out for this.	Screening Questions
0:08:10	Observation			Wasn't sure if he was answering each of the four PTSD criteria separately or together even though there was only one "yes/no" option. He said he would say "yes" to 2 items and "no" to the other 2 items.	Screening Questions
0:09:01	Other - interviewer note		Technical	Experiencing difficulty with Internet - slow to respond and "Internet Explorer cannot display the webpage."	At Screening Questions
0:10:16	Other - interviewer note			Answered "yes" to SMI screening question. Said he didn't know what Bipolar Disorder. Not sure what he was endorsing but he would've screened out here as well.	Screening Questions
0:12:59	Other - interviewer note		Structure - format; Content - language	Looked for way to "answer" the exercise definition screen. Decided to click next without assistance.	Exercise
0:17:42	Other - interviewer note		Technical	Realized that we told Pro-Change the appointment was cancelled and forgot to tell them when we filled the openning at the last minute. Might be the cause of the technical difficulties if Pro-Change was working on the system at the same time.	At Healthy Eating

Time	Type	Pos/Neg	User Event	User Event Description	Screen Description
0:35:42	Other - interviewer note		Structure - images; Technical	Images did not show up on the majority of the screens due to technical issues so participant didn't/couldn't comment on them.	General

Time	Type	Pos/Neg	User Event	User Event Description	Screen Description
0:01:39	Observation	Negative	Structure - Color	Doesn't like the colors	Log-In
0:02:32	Error - resolved by participant		Structure - Layout	Logged in to Returning User then got error message saying previously not registered. So went to New User to register without assistance.	Log-In
0:03:30	Observation		Content? - Unexpected	Security questions are different from those normally asked	Security Questions
0:04:51	Observation		Structure - Text	I would just skim this	Study Fact Sheet
0:06:14	Observation	Positive	Content? - Informative	Likes that Fact Sheet provides contact info if participant needs help	Study Fact Sheet
0:11:17	Observation		Content - Instructions	Confused about instructions for satisfaction but continues	Quality of Life Questionnaire
0:15:32	Observation		Structure - Layout	Wishes the screen/font was bigger (not used to laptop-size). Told her she could maximize the screen.	Healthy Eating
0:17:07	Observation	Negative	Content - Language	Prefer if these (types of) questions were asked in a different way. Thinks they "put [her] on the spot" or are "finger pointing."	Healthy Eating & Responsible Drinking
0:18:56	Observation	Negative	Structure - Text	A lot of words on the screen which may be difficult for older Veterans or those with severe depression/PTSD. Said she likes to read & is in school now & she thinks the screens are "wordy" & she feels "edgy."	Preventing Depression
0:20:00	Observation		Content - Response Options	Thinks response options are too narrow. But then says maybe we wanted to categorize responses in this way.	Preventing Depression
0:20:43	Observation		Structure - Image	Not sure what image is (next to the word "wellness").	Thank You
0:24:44	Observation	Positive	Structure - Image	Liked the picture of person sitting on a lounge chair; wished it was bigger; already makes her feel calm.	SM Program Homepage
0:28:59	Error - resolved by participant			Missed an item/radio button & got an error message. Read the message, answered the item & moved on.	SM Activities Questionnaire
0:30:43	Observation	Positive	Structure - Image	Likes pictures with people in them	Activities & Strategies: Taking a Healthier Approach

Time	Type	Pos/Neg	User Event	User Event Description	Screen Description
0:30:48	Px Prompted	Negative	Content - Feedback	Px was asked what she thought of the feedback since she hadn't made any comments on the last few screens. Reported that they seemed too "general." She suggested using examples but was unable to provide specific suggestions.	Activities & Strategies: Taking a Healthier Approach
0:31:29	Observation	Positive	Structure - Image	Said she "definitely" likes the picture of the ladybug on the yellow flower.	Pros & Cons
0:32:34	User needs help	Negative	Content - Instructions	Confused about how to answer the questions. Siad if she were by herself, she would just "muddle through it."	Pros & Cons Questionnaire
0:34:26	User needs help	Negative	Content - Instructions	Doesn't understand what the screen means by "what is your most important Pro for managing stress?"	Weigh the Pros & Cons
0:35:46	Observation	Negative	Content - Language	Thinks feedback is poorly worded. Said she would "laugh at that."	Your Level of Confidence
0:36:31	Observation	Negative	Content - Language	Thinks feedback is inappropriate based on her responses to the questionnaire items. Thinks asking someone who IS confident what they do (feedback provided by program) is not the first thing she would do & that she wouldn't even be able to recognize if someone was confident in order to ask them.	Your Level of Confidence
0:37:17	Observation	Negative	Content - Language	Thinks feedback could be worded differently to be "more empathetic" and less "you, you , you." But she liked the suggestions.	Your Level of Confidence feedback
0:38:13	Observation	Positive	Content - Instructions	Said she likes to answer these types of questionnaires because she understands what they're asking of her and she can answer them quickly (e.g., as opposed to the other questionnaires that ask how important was blank in your decision to…)	Your Own Experience Questionnaire
0:41:00	Observation	Negative	Content - Language	Said that feedback could be elaborated on with more specific examples (similar to her other comment on the feedback screens).	Your Strategies for Change feedback

Time	Type	Pos/Neg	User Event	User Event Description	Screen Description
0:41:38	Observation	Negative	Content - Language	Again, participant thinks feedback could be reworded, using less "you" and "your" type feedback so it sounds less blaming.	Your Strategies for Change feedback
0:42:33	Observation	Positive	Content - Language	Likes the exercise of writing things down (3 fill-in-the-blank boxes) because it reminds her of exercises that her e.g.,	Your Strategies for Change: Use
0:43:15	Observation		Content - Language	Said there was not enough elaboration on feedback but it was still overall because she likes using calendars to remind her.	Your Strategies for Change: Make a Commitment
0:43:59	Observation	Positive	Content - Language	Likes that it gives websites. Said she would go to the site to get ideas.	Your Strategies for Change: Get Support
0:45:19	Observation	Positive	Content - Language	Likes when the program gives positive feedback/encouragement, for ex., "Way to go!" Thinks it would make most people feel good.	Small Steps
0:46:43	Observation		Content - Language	Said she would read the whole report and when asked, said she thinks she would print it out as well.	Report
0:48:48	Observation		Content - Language	Said she doesn't use Amazon much, but getting a gift card is nice.	Report
0:50:14	Observation	Positive	Content - Language	Likes that it's tailored (SoC) to where the person is in their management of stress.	E-Workbook Homepage
0:52:14	Observation	Positive	Structure	Likes that it's like a workbook - can work on it a little bit, save, and come back to it later.	E-Workbook
0:52:25	Observation		Structure - Layout	Sees that the pull-down menu is on the right and she can pick which topic she wants to look at in more detail.	E-Workbook
0:53:15	Observation			Thought the program would give her more info/skills but then thinks that that's probably what the e-workbook will provide.	E-Workbook
0:54:23	Observation	Negative	Content - Instructions	Doesn't understand what she's supposed to do. She said she would have to read it again. (53:44-56:20)	E-Workbook: 50 Benefits of Managing Your Stress.

Time	Type	Pos/Neg	User Event	User Event Description	Screen Description
0:02:02	Other		Structure - Layout/Text	**Initially appears like participant will go to Returning User but catches that he needs to register as a New User**	Log-In
0:02:13	Participant prompted			Prompted participant to register	Log-in
0:09:44	Other			Note: Would have screened "out" of secondary screening questions	Screening Questions
0:14:37	Observation	Positive	Content - Language	Apologized he wasn't commenting on the program. Said the questions were easy to understand and answer so he forgot to comment as he went along.	Perceived Stress
0:16:32	User needs help		Content - Language	**Asked participant what a question (QOL - Having and Rearing Children) meant. Asked him what he thought it meant. Said that he just didn't read it carefully enough & now he understands it. Asked him to explain why he selected his response. His justification seemed like he understood the question to me.**	Quality of Life
0:17:57	Error		Structute - Layout	**Clicked on "next" button before completing questionnaire items on second screen of questionnaire. (Seemed like he thought he already answered the items since screen looked the same as the previous one). Got error message, read it, and completed the items without assistance.**	Quality of Life
0:19:42	Error		Structure - Layout/Text	**Participant didn't catch that the previous screen asked if he currently smoked (which was "never" for him) so when he got to this screen (how long ago he quit), he didn't know how to respond. Suggested participant return to the previous screen and he noticed his error.**	Current Smoking Habits
0:21:02	Observation		Structure - Text	Suggested that this definition screen of exercise activity levels could be shortened/simplified.	Exercise
0:21:57	Observation		Structure - Text	Suggested that this definition screen of healthy eating could be more detailed.	Healthy Eating
0:22:19	Observation		Content - Language	Thought "sometimes" should be an additional response option on this screen.	Healthy Eating - eating number of calories to reach and maintain healthy weight

Time	Type	Pos/Neg	User Event	User Event Description	Screen Description
0:23:30	Observation		Content - Language	Commented that this definition screen should be combined with the question screen (as well as other similar definition/question screens) so you don't have to remember the definition or click "previous" button.	Responsible Drinking
0:27:59	Participant prompted	Positive	Content - Language	Asked participant if the program made sense so far. Said it did.	Program Home Screen
0:31:32	User needs help		Structure - Layout/Text	**Said he was "lost" when he gets to the program welcome screen. Reported that he didn't read the screen thoroughly because it seemed like the information on the screen was presented earlier so thought he could skip/skim. Said he wasn't sure what to do next and initially, thought he was done and wouldn't need to return for a month. Then he read the screen and realized he needed to continue and selected the DP program.**	Program Home Screen
0:39:50	Observation	Negative	Structure - Text	Said that some screens are a little wordy. Said that the information is good but might not be good keeping someone's attention.	Advantages and Disadvantages
0:44:05	Observation		Content - Language	Said for clarity, he would prefer "sometimes" instead of "occasionally" as a response option.	Your Own Experiences
0:45:12	Other		System	**Went "back" 2 screens and the system cleared his answers to the first screen. Confused because he thought he was on a new screen but the questions were repetitive.**	Your Own Experiences
0:46:43	Observation		Content - Language	Said that one of the questionnaire items were similar to another. He said it made him concerned about how he answered a previous item because he wanted to be consistent.	Your Own Experiences
0:53:33	Participant prompted	Both	Content - Language/Text	Asked participant what he thought of the feedback. Said he thought it was kind of basic (e.g., go for a walk) especially for people who have had previous counseling. But he likes the fill-in-the-blank options because they helped him think about options.	Your Own Experiences
0:57:35	Observation	Positive	System	Commented that being able to print out a copy of his report was good because he could see how he's doing and what he could work on.	Your Summary
1:00:26	Observation		Structure - Layout	Commented that the DP and SM programs look similar.	Stress Management Activities

Time	Type	Pos/Neg	User Event	User Event Description	Screen Description
1:00:44	Observation		Structure/Content	Commented that real program users wouldn't have to do the two programs back-to-back (implying it was a lot to do at once). Told it would be up to the user but that they could return or do them at once depending on preference.	Stress Management Activities
1:24:59	Participant prompted	Both	General	Asked what he thought of the programs in general. Said he thought they were good, especially the fill-in items because they make you think. When prompted, he said there was nothing he saw that wasn't appropriate for Veterans. When prompted if program would be helpful, said that for him, it was a lot of text on each screen.	Program Home Screen
				BOLDED user event descriptions indicate times participant may have had difficulty with program because he didn't read the text thoroughly. Also perhaps an issue with how the text is presented.	

Time	Type	Pos/Neg	User Event	User Event Description	Screen Description
0:02:06	Other			Note: Initially looked like participant was going to try to log-in as a Returning User. But before he entered anything, he saw that he needed to register first and he did without any difficulty.	Log-In
0:05:17	User needs help		Content - Instructions	Confused about screening criteria (inpatient treatment); would've screened out	Screening Questions
0:10:07	Participant prompted	Positive	Structure - Color/Layout; Content - Language	Asked participant if he understood everything because he hadn't been making any comments. Said he understands the questions. Commented that he likes the colors because they're soothing. Also said it was easy to navigate the program.	General Questions
0:23:05	Observation	Negative	Content - Specific Item	Didn't connect with an item (i.e., if he was less depressed others would expect more from him). Said he felt the opposite way (i.e., excells when others expect more - drill sargeant, coach).	Advantages & Disadvantages Questionnaire
0:27:34	Observation	Negative	Content - Questionnaire Items	Said that being in the military, being male, and raised in the culture he was raised in, he wasn't encouraged to express things so some items didn't resonate with him.	Your Own Experiences
0:30:38	Other	Negative	Technical Difficulties	Program didn't respond if the "Next" button was clicked more than once. Had to close out screen and go back to Home Screen. Previously happened when Pro-Change was not informed we would be doing usability testing. However, they had been informed of testing this time.	Your Own Experiences
0:40:28	Observation	Positive	Structure - Image	Liked picture of a man relaxing in a hammock.	Your Summary
0:44:01	Observation	Positive	Content - Informative	Said learning about how to use disputing statements would be a good idea	E-workbook - Use the ABCDs

Time	Type	Pos/Neg	User Event	User Event Description	Screen Description
0:46:04	Participant prompted	Both	Structure - Layout	Asked participant if he would've felt he needed to/filled in all 7 text box examples if he was at home. Said he might not have even gone to the e-workbook at all. But he enjoys "mental stimulation" so it would depend on if he had the time. Said some links sounded interesting.	E-Workbook - Increase Positive Thinking
0:49:11	Observation	Positive	Content - Links	Said he would click on certain e-workbook links out of curiousity.	E-Workbook - Thought Stopping
0:50:07	Participant prompted	Both	Structure - Color/Layout/Text	Asked participant what he thought of the program in general. Said he liked the colors. Suggested adding drop-down menus at the top of the screens so options are easier to see. Also suggested not putting too much information on each screen since that can be off-putting & encourages skimming. Suggested only putting summaries of the important information and have links/drop-downs as an option for those that want more detailed information.	(Program Home Screen)
0:52:03	Participant prompted	Positive	Content	Asked participant if he would use this program. Said he would because he is trying to better himself after experiencing post-deployment issues.	(Program Home Screen)
0:52:49	Other		Confidentiality	NOTE: Participant says his name	(Program Home Screen)

Time	Type	Pos/Neg	User Event	User Event Description	Screen Description
0:01:56	Other - interviewer note		Structure - layout	No difficutly (other than Internet) understanding that he was "not a Returning User" and needed to register first. (Side-by-Side New User/Returning User)	Log-In
0:05:28	Observation		Structure - text	Initially thought he was supposed to click on which of the trauma criteria applied to him but then he noticed the "Yes/No" options and radio buttons at the bottom of the screen.	Screening Questions (Trauma)
0:11:32	Other - interviewer note		Structure - font size	Text may be easier to read if the font size is increased; however, this may affect the alignment of the text. For example, the questionnaire items may take up too much room on the screen so the participant had to keep scrolling up to see the response	e.g., Military Experiences
0:14:52	Observation		Content - language (response options)	Had difficulty deciding between "never" and "several days" response options. Said there should be a middle option such as "1-2 days".	General Questions
0:15:21	Observation		Structure - font size	Said it kind of bothered him that the "p" in the word "problems" was cut-off. (Likely because the font size was increased.)	General Questions
0:16:28	Observation		Content - language (response options)	Said the questionnaire items sounded like they should have "Yes/No" response options rather than "not at all" etc. (Even though the question asked "How often…".) Agreed that response options could be more specific like "1-2 days a week", etc.	General Questions
0:19:49	User needs help		Content - language	Assumed the questions had to do with combat since the heading was "Combat Experience". Wasn't sure how to answer items if he wasn't in combat. Assisted participant to think of items as pertaining to his military service (as the instructions indicate) rather than during combat. Participant suggested changing the heading to "Combat or Military Experience."	Combat Experience
0:23:23	Observation		Structure - font size	(Related to increased font size) said that response options could be repeated on the side, etc. so participants don't have to keep scrolling up. (Didn't notice that response options appeared if cursor was over the radio button.)	Quality of Life

Time	Type	Pos/Neg	User Event	User Event Description	Screen Description
0:31:40	Participant Prompted		Content - language	Asked participant if he understood what he needed to do if he was in the feasibility study. Said he thought participants should log-in MORE than once a month since their status may change. Thought that the Thank You screen seemed like a class syllabus and that it might deter participants because it looks like a lot of work. Said he thought the word "compensation" sounded like he was goingt o be "sold" something and it put his guard up.	Thank You
0:35:12	Other - interviewer note	Positive	Content - language; Structure - layout	Understood he was supposed to click on a program (i.e., Stress Management) and did not have to be prompted to continue.	Program Homepage
0:37:21	Observation	Positive	Content - language	Said he liked that the program said "the stress management program can help" on the first screen. Siad it was "a good pitch."	About This Program (SM)
0:37:41	Observation		Content - language in links; Structure - text	Clicked on the link to the TTM to find out the definition. Said the pop-up box had more information that what he was looking for and initially said it didn't provide the definition. Later, he said that he had heard of the stages before and called it "PCPM" (as an acronym) and was able to describe the stages.	About This Program
0:39:45	Observation	Positive	Structure - image	Said he liked the image of his stage of change.	Your Stage of Change
0:41:35	Error		Structure - error message	Missed a questionnaire item and received an error message. Saw which item he missed (thought he answered it but realized he accidentally answered the wrong item) and answered it without assistance/prompting.	Stress Management Activites
0:43:56	Other - interviewer note		Content - language	Prior to usability testing, participant completed a hard copy stress management questionnaire and didn't know what the term "poke fun" meant. He noticed that the same item appeared at this point in the program. Had he not be explained the meaning of the term earlier, he might not have known how to answer it or would have guessed.	Stress Management Activites
0:45:32	Observation	Negative	Content - language	Said it wasn't clear that the feedback screens were giving him suggestions based on his previous responses. Said the headings (e.g., Activities & Strategies - Being Prepared and Planning Ahead) didn't described that it was tailored feedback.	Activities & Strategies
0:50:09	User needs help		Content - instructions	Initially started answering the questionnaire items without reading the instruction question at the top of the screen & therefore said the items didn't make sense. Suggested participant read the instruction question and then he said he understood the items.	Pros & Cons

Time	Type	Pos/Neg	User Event	User Event Description	Screen Description
0:50:35	Observation		Structure - font size	(Font size finally changed to small.) Said he could read the smaller font because he had his glasses on and liked that he could see all of the items on the screen without having to scroll down.	Pros & Cons
0:52:40	Observation		Content - language (response options)	(Again) said the wording is unclear on the questionnaire items (importance of the items to effectively manage stress). Said he thought they sounded more like "Yes/No" items.	Pros & Cons
1:03:17	Observation		Structure - image	Image - said the picture (man with zen garden) was distracting because he couldn't tell what it was. He said it kept drawing his attention away from the text because he wanted to know what the man was doing.	Your Strategies for Change
1:05:52	Observation	Negative	Content - language (unclear)	Thought that when the previous screen said that it's time to "pick a start date", it meant that this screen would give him a date or have him select a start date, etc. He was confused and disappointed that he didn't see what he expected. He said actually picking a start date within the system would increase his commitment to change.	Thank You
1:08:33	Participant Prompted			Asked if he would do both programs back-to-back or return later if he were in the feasibility study doing this at home. He said he would most likely do the programs back-to-back.	Program Homepage

Time	Type	Pos/Neg	User Event	User Event Description	Screen Description
0:05:58	Other - interviewer note		Computer literacy	Realized that participant was not screened and he was not comfortable using the computer/Internet (would have been ineligible for usability interview). Decided to let him continue and test the system as a non-computer literate user with our technical assistance. Had difficulty entering information and needed a lot of assistance.	Log-in
0:14:16	Error		Content - language	Answered "yes" to screening question and would have incorrectly screened out (of feasibility study). Said it was because he has "depression" and didn't understand what "manic-depression" was. (Perhaps there could be a link to a definition of less familiar terms like these.)	Screening Questions
0:18:49	User needs help		Structure - layout	Tried to click on a bullet to respond on an instruction screen (no questions).	Healthy Eating
0:29:16	User needs help		Content - language	Confused about the staging screen. Thought it was asking how long he's been depressed versus when he was planning on starting depression prevention strategies.	About this Program (DP)
0:29:47	Observation		Structure - layout	Again, tried to click on a bullet to respond on an instruction screen (no questions).	About this Program
0:37:16	User needs help		Structure - layout	Again, thinks he needs to click on the bulleted items to respond even though the screen was only informational.	Depression Prevention Activities
0:38:51	User needs help		Structure - layout/text; Content - questionnaire items	Asked for clarification regarding the questionnaire items. Suggested he read the main question/instructions. He did, and was then able to answer the items.	Advantages & Disadvantages
0:40:03	Participant prompted		Structure - progress bar	Laurel asked if he understood what the bar was at the bottom of the screen. Participant guessed it gave a message of how depressed he was. Laurel told him it was a progress bar and then he understood.	Advantages & Disadvantages

Time	Type	Pos/Neg	User Event	User Event Description	Screen Description
0:54:04	User needs help		Content - language	He wasn't sure what he needed to do on this screen. Thought the "report" button might be asking him to report "on" something. Was told to click on it to get his personalized report.	Thank You
0:55:05	Other - interviewer note		Technical issue	Wasn't able to enlarge screen so had to adjust to 100% so could see all the text in the screen.	Personal Health Report
0:58:24	Participant prompted		Both	Asked participant if he thought this program would be helpful to him. Responded that he wasn't sure if he would turn to this program because of his particular situation, but he thought it did have some helpful suggestions which might be more helpful to others. Thought information could be more specific and include other areas of depression (e.g., hopelessness, living situation).	Personal Health Report

Time	Type	Pos/Neg	User Event	User Event Description	Screen
0:03:07	Other - interviewer note		Structure - layout	Said she needed a Log-In Name but then went to More Information about the program.	Log-In
0:04:32	Other - interviewer note		Structure - layout	After participant closed the Study Fact Sheet/More Information, she said she would register as a New User. Prompted her that she could enter any information here.	Log-In
0:05:33	User needs help		Structure - layout	Selected the three Security Questions from the drop-down boxes but did not provide any answers. Received an Error Message and didn't know how to resolve the error. Was prompted that she didn't answer the security questions and needed to register again.	Log-In
0:08:23	Other - interviewer note			Would have screened out at Trauma Criteria.	Screening Questions
0:10:47	Participant prompted		Structure - layout/images	Asked participant what she thought of the "new" homepage (revised recently by Pro-Change). Said she would have suggested adding pictures, but then she said she scrolled down and saw the pictures at the bottom of the screen. Said she would make the pictures more prominent (e.g., on the sides or top of the screen) and make them more relevant to the programs (e.g., someone putting out a cigarette).	New Homepage
0:14:15	Participant prompted		Content - language	Asked participant to verbalize what the homepage was instructing her to do. Said she thought it should say, "Now that you've completed your assessment/looked at your personalized report, the next step is…" so the participant knows exactly what to do next. Said she would also add go to programs "to the left of the screen" so the participant knows where they need to go to select their programs.	New Homepage
0:17:19	Participant prompted		Content - language	Asked participant what she thought of the "old" homepage. Said she thought it explained what to do more thoroughly and was easier to understand than the revised/new homepage.	Old Homepage

Time	Type	Pos/Neg	User Event	User Event Description	Screen
0:18:04	Participant prompted		Structure - image	Asked participant what she thought of the image and she provided several suggestions. She said the colors could be more vibrant, could include different images, and the images could be moved to the top or sides of the screen. She said in general this screen is very "sterile" and uninteresting.	Old (and New) Homepage
0:20:11	Observation		Structure - image	Said she would add an image of a really stressed out person (like hair's being electrocuted) on one side of the screen and a really relaxed person on the other side - like a before and after program.	Stress Management Homepage
0:21:09	Observation		Structure - image	Would use pictures along with the text.	About This Program
0:22:26	Observation		Content - language	Initially she thought the Stages of Change screen was about the different types of stress. Clicked on the TTM link to find out more information. Said the information could be simplified but was understandable.	About This Program
0:24:35	Observation	Positive	Content - language	Said this screen was explained well.	About This Program (3rd screen)
0:28:41	Participant prompted		Content - language	Asked participant if she knew what the term "poke fun" meant. She accurately replied that it meant to laugh at sources of stress in your life.	Stress Management Activities
0:29:32	Observation		Content - language	Said the information on this screen seemed repetitive & said last question could be reworded to "to see more progress…" instead of "to make even more progress."	Activities and Strategies
0:31:23	Observation		Content - language	Said "Taking a Healthier Approach" screen should provide some positive examples. Said the screen could say "in order to avoid (this category)" and then provide some options.	Activities and Strategies - Taking a Healthier Approach

Time	Type	Pos/Neg	User Event	User Event Description	Screen
0:33:41	Observation		Content - language	Thought this screen focused too much on stress and the negative instead of taking your mind off of the stress. Said should have positive ideas (e.g. go for a walk, take a bath, drink a cup of tea, etc.).	Activities and Strategies - Focusing on Your Response to Stressful Events
0:35:36	Observation		Content - language	Thought some questionnaire items could use skip patterns since she thought if she agreed to one item, it would make others irrelevant.	Pros & Cons
0:38:17	Observation		Content	Thought the program was appeal to more people if it was tailored to participants in other areas (e.g., weight management).	Weigh the Pros & Cons
0:40:31	Observation	Positive	Content - language	Thought the insturctions and questionnaire screens made sense.	How Confident Are You
0:46:38	Observation		Content - language	Thought the questionnaire items were "sterile" and didn't reflect what she considered stressful experiences.	Your Own Experiences